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GAS JOURNAL

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[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLI. No. 2984.] LONDON, JULY 21, 1920. [72nd Year. Price 8d.

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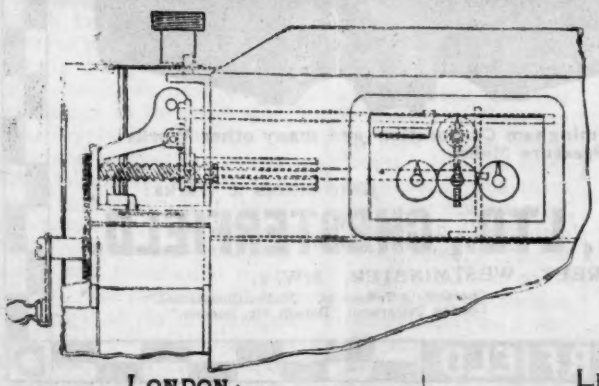

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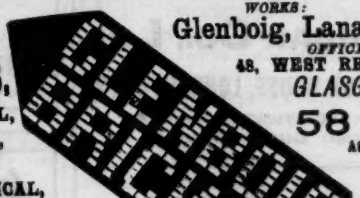

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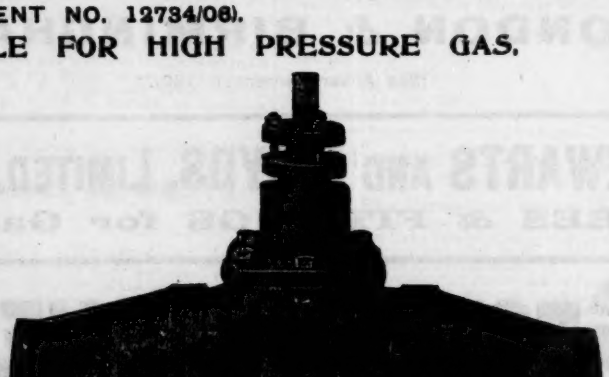

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VOL. CLI., No. 2984.] WEDNESDAY, JULY 21, 1920. [72ND YEAR.

EDITORIAL NOTES.

The Gas Strike and a Regional Review of the National Agreement.

THERE has rarely been an equally, and certainly never a more, foolish or unwarranted strike than that which has been witnessed in the Manchester district over what it was agreed should be a national settlement of the demands made, on behalf of gas workers in the United Kingdom, by the National Federation of General Workers, and which agreement was endorsed by the whole of the affiliated unions. This endorsement alone condemns the outbreak in Manchester and district, and so does the fact that a vast majority of the gas workers of the country loyally accepted the agreement arrived at by their representatives after long and critical discussion with the representatives of the Gas Employers' Federation. Mr. J. R. Clynes, M.P., Mr. Will Thorne, M.P., and Mr. James O'Grady, M.P., we believe regard the rebel action of the men in the Manchester and other districts as something in the nature of a personal reflection. We are not surprised at this. But any such feelings they may possess in this respect may be assuaged by knowledge of the considerably larger measure of acceptance that there has been throughout the United Kingdom. There was no spreading of the disaffection beyond that reported in our last issue; and this again indicates the purely local nature of the revolt against the decisions participated in by the men's own leaders. From the trade union point of view, this display of want of discipline in the Manchester district, Bristol, and one or two smaller places is precisely the sort of thing that must damage. and that profoundly, the most vital principles of trade unionism. The very expression "trade union" signifies unity of action, and unity of action incorporates collective bargaining, and the results of collective bargaining are the subjects for universal acceptance. In their unwisdom, the Manchester district and the Bristol men apparently think otherwise. Trade unionism is something of mere superficial significance to them. It is all right in their view only so long as it is arbitrary and despotic, and so long as its claims are not subject in any way to questioning, discussion, investigation, give-and-take, or statesmanlike dealing. They evidently prefer, when once demands are formulated, that their leaders should go as bullies to the employers, instead of as sane and responsible men, prepared to substantiate the rightfulness of their claims, or to ease them in the light of justification for doing so from the employers' side. To many other unionists, the trade union system has a deeper significance; and they will be as annoyed at the degradation the system has suffered through the misdirected tactics at Manchester and elsewhere, as are the domestic and industrial victims of those tactics in the areas concerned.

Personally, we have no great sympathy with national bargainings as to wages and hours in such an industry as gas supply, in which the conditions between one undertaking and another are so vastly different. But the trade unions themselves elected the national ground; and there was no preliminary hint that the Manchester district men, and those of Bristol, Weston-super-Mare, and one or two small Welsh places considered that their cases demanded special and preferential treatment. If the basis is to be national, then there should be no claim, or any recognition of the right to claim, subsequent reconsideration on a sectional basis. The Gas Employers' Federation never dreamt that there would be this sporadic revolt against constitutional authority and procedure as represented by the Trade Union Federation with whose leaders they were dealing. There must henceforth be a clear understanding on this point; and the only way to clear understanding is by the leaders educating the rank-and-file up to better notions of what trade unionism means, and to an appreciation that an honourable agreement must be the subject of honourable adherence. Otherwise what is the good of such innovations as the Whitley and other Joint Councils or Boards which have for their object the settling of disputes or the remedying of grievances by mutual inquiry and discussion, instead of having recourse to the crude "down-tools" method which brings disturbance, inconvenience, and loss to countless people, including the strikers themselves. Here in this case is an agreement which is only binding so long as there is no under-cutting of its terms. But it does not deny consideration to special circumstances, or the redressing of real grievances by the administrations of any single undertaking. Even in the recognition of elasticity to this extent, there is the danger of imaginary grievances being dressed-up as real ones, and of scope being given to ingenuity and inventiveness. So long as an undertaking complies with terms agreed to by accredited representatives, there is no excuse for striking, and bringing misery and waste upon the communities and industries of big cities and towns. Here, however, was an opportunity for extremists. They took it; and unfortunately for the honour of the gas workers in the areas concerned, and the good name of trade unionism, they had a sufficient following to do untold mischief.

To what end? Last Wednesday night an arrangement was made in Manchester that the men should return to work on Friday, on a promise by Alderman Kay that the questions over which there was grievance should be reconsidered by the Regional Council. There was nothing in this arrangement that the men could not have obtained by peaceful method, instead of the drastic and harmful course that ill-advice induced them to take. No doubt the decision arrived at to return to work was largely accepted by the men who had shown such determined spirit all through the week, by the earnest appeal to them of Mr. Clynes, who laid it down as a condition precedent to efforts being made to obtain a review of the terms that the men should return to work, and gas supplies should be restored. But we do not like the written guarantee given by Mr. Clynes: "If "after work being resumed, the Regional Council do not "reach decisions which the men are prepared to accept, "Mr. Clynes undertakes to support the men in their desire "to cease work to enforce claims which the men can accept." This is not a defence of the original agreement; it is tantamount to a promise of further concession, whether obtained by peaceful or other means. The outlook is not satisfactory; and there are yet some clouds about. Here is a case where a national agreement is to be reviewed on a regional basis. This is not right; and the gas undertakings in the large tracts of the country where the agreement has been accepted would have good ground for objection to any overriding of a national agreement by regional decision, even though intended to have application only within the region concerned. We know full well, without specific telling, what this will mean; and there is no need for us to dwell upon it here.

The national basis is a conception of the trade unions, and was insisted upon by them; and trade unionists are the first to reject the issue of negotiation on the national basis. We as much resent this as we condemn those representatives of one or two gas undertakings—we are glad there are not more—who publicly state that they intended to decline to adhere to the agreement. If the Manchester men want an excuse for their action, they can point to these gas undertakings as examples of repudiation on the other side. It would, however, be a poor excuse, seeing that the employers

at none of the works at which strikes occurred had any idea of doing aught else than comply with the terms of the agreement. However, a national demand was made; it was discussed on that basis; a national agreement was arrived at; and there is now to be review by a Regional Council. The questions are: Where are we? and, Is it likely this sort of thing will occur again. The Gas Employers' Federation must obtain a definite understanding on the point from the proper quarter. We recognize the grave difficulties of Manchester and other concerns; but so we do the want of finality in this mode of procedure. The men who struck have in the aggregate lost a considerable amount of wages; and as the strikes were unauthorized, there is for them no trade union pay. But their losses are insignificant compared with the unnecessary losses and inconveniences inflicted upon others through their abstention from work.

Developing Power of Clause Ten of the Bill.

THE House of Lords did not take the Committee stage of the Gas Regulation Bill as pre-arranged last Thursday; the subsequent fixture for the purpose was yesterday; and our latest information is that Thursday will be the day. Certain amendments have been notified for consideration, which, for the most part, are intended to simplify the enactments, and make them still more explicit. When the Bill becomes law, it will be about as free from obscurity as any measure which we know intimately. The only uncertainty about it will be the way in which the powers will be exercised by the Board of Trade; but on that point we have the fullest confidence in the Board. Among the alterations to which it is proposed to give effect in the House of Lords, is one which places upon Quarter Sessions, instead of upon two Justices, the power to appoint a gas examiner where there is negligence to do so by a local authority. The contribution to the gas fund by statutory undertakings, it is now suggested, shall be rendered at 3s. per million cubic feet, in lieu of £15 per 100 million cubic feet, which is the same thing with a more modest appearance; and the contribution is to be levied on the gas sold by the undertakers "in the preceding year."

Clause 10—the one which authorizes the Board to make Special Orders—it is proposed shall be extended somewhat to make it more comprehensive. One addition is to empower the Board to authorize any local authority to supply gas outside its own area; another is intended to allow the Board to sanction the purchase by agreement of undertakings; while a third proposal will give them the right to permit the rearrangement of capital by conversion of stock into shares (which is a reversal of the usual order of things); and, finally, in this connection it is intended to invest the Board with authority to make such supplemental and consequential provisions as appear to them necessary to give full effect to a Special Order. To say the least, this clause 10 is a far-reaching one; and we strongly urge gas administrators and engineers, when the measure has received the Royal Assent, to study it well with an eye to investigating how it will assist them in the development of their undertakings, and help in the regional concentration of gas production, which is one road to economy. Among other things, a Special Order may authorize gas undertakings to obtain a supply of gas in bulk from any source whether situated within or outside their authorized limits of supply; to supply outside their area; to give a separate supply of gas for industrial purposes; to make arrangements for joint working, amalgamations, and purchase of undertakings; and to grant the necessary money powers. Special Orders can be secured by easier and cheaper means than Acts of Parliament; and so clause 10 should have a large part in the development of the business of the industry by concentrating the work of gas production. It is the policy adopted by the Government in connection with electricity supply.

Certain useful new clauses affecting meters are proposed. Clause 12 extends the powers and duties of the Board under sections 5 and 6 of the Weights and Measures Act, 1904, to the instruments used for measuring gas. It is proposed to insert a new clause, providing that "all meters by means of "which gas is supplied by any undertakers to any consumer "shall be stamped in accordance with regulations made "by the Board of Trade under their powers in that behalf; "and if any undertakers supply gas by means of any meter "which is not so stamped, they shall be liable on summary "conviction to a fine not exceeding ten pounds." There is nothing vague about this clause; and, as it stands, it is comprehensive, and it may provide for the impossible, unless the regulations to be issued by the Board do not vary by a single expression from those under which the stamping and certification of meters are now carried on. "All" meters. That would comprise those now fixed; and so we would suggest, in view of the penalty, that the clause should be made to exclude all existing meters until they are taken out for repair, reverification, and re-stamping. There are to be examinations of applicants for the post of inspectors of meters; and no person is to hold the position who is not certified as the result of examination. This is a necessary stipulation.

The "B.C.G.A" and Revolution in House Construction.

ONE of the hardest pieces of work of which we know is to get people to renounce old theories, practices, formulæ, and habits. As things have been, so things ought to be is the belief of many; and conversion of men's minds and ways has to have small beginnings the same as changes in more material things. We see this in every walk of life, and in all human activities. But the war was of great educational value—if in all other respects it was painfully destructive; and to-day more than before men are receptive of innovation that means saving in expenditure and labour. In the past one of the most difficult things imaginable has been to get architects and builders to see that chimneys, chimney stacks and pots, chimney breasts, coal grates and ranges, and much of the space occupied by them, have been rendered unnecessary by the efficiency of gas-fires and other gas-heated appliances, to say nothing of the atmospheric polluting effects to which all those "back numbers" in the progress of civilization and refinement contribute while they exist. To continue to perpetuate them beyond the extent which economy suggests in the way of continuous heating is positive waste, and an insult to intelligence. The British Commercial Gas Association have worked for years persistently in this matter; but we do not think the gas industry fully recognizes what has been done in this connection by the Association, and long before what we now call the "housing schemes" were occupying the minds of local authorities and their architectural advisers. The Association were before the war talking of, and circulating information as to, the built-in gas-fire and "economy flue." We trace this back at least to 1913; and now the spade work of that time, and the cultivation since, are about to bear fruit. The housing schemes have offered rich opportunities for demonstrating the truth that gas-heated appliances have put into the hands of architects and builders a means of revolutionizing house construction, and introducing cleanliness and labour-saving economies which will progressively have a beneficent effect upon the conditions of life. When once, through demonstration, the change obtains a firm hold, we are confident that there will be a very rapid spreading of revision in house-planning to the advantage of the community, and incidentally to the undertakings that pipe fuel to houses, and permit its free use either on credit or by prepayment. Houses without coal ranges or grates (with perhaps the single exception of the living-room grate), but with gas-fires, cookers, and water-heaters fixed, will mean assured prosperity to the gas industry. This is a matter that is vital to the progress of the industry.

As remarked, seven years have now passed since the "B.C.G.A." first started the new doctrine of house designing and building reform by the modifications made possible by gas-fires and gas-heated appliances. Two years later an article on the subject appeared in the "Builder" which attracted a considerable amount of attention; and four years subsequently [in 1919] this article was supplemented by a further one containing additional information. The Editor of our contemporary was considerably impressed by the building economy which, from supplied particulars, he saw was possible by the change from solid to gaseous fuel. The 1919 article brought the subject up to date; and both articles were reprinted in pamphlet form by the Association, and distributed broadcast among architects and builders. These allusions to past effort are only made—not that they compass the work in this particular that the Association have done (for there has never been any cessation of endeavour on the part of their experts and officials)—to show how persistent and long must be work where custom has to be beaten-down, and change to better con-

ditions be made, and for the better conditions to become the new custom. The fruit is maturing, and the gathering-in will soon begin. The Government housing schemes opportunely came to the front; and now from various memoranda on the subject issued by the Government Departments concerned, we learn how Mr. F. W. Goodenough (the Chairman) and the members of the Executive Committee of the Association have taken a large part in conferences with officials of the Ministry of Health, the Office of Works, and other Departments in pushing the claims of gas to promote house reform and economy, while the experts of the Association have also been in touch with the active officials of the departments. The suggested revolution in building construction has now been accepted; but it was not accepted immediately, or on superficial grounds, or at the values that the Association placed upon it, until there had been—at first some opposition, and then investigation, with a result showing intrinsic worth which could not be assailed. It can now be said that the Ministry of Health is so far in accord with the idea of houses without chimneys that the Office of Works have actually passed plans for the building of some sample houses that will include a number of gas-fires with "economy flues," which, of course, are unsuitable for coal fires. This is a gain of immense potential value; and it will have a great effect upon house design and building in all future time, as well as upon the structural modification of existing dwellings. It broadens and immeasurably lengthens the roadway along which the gas industry will pass in becoming more and more the fuel suppliers of the country by means of distribution which marks definite progress from the crude arrangement of delivering coal over the surfaces of roadways from house to house. This is, in short, a social reform of far-reaching order.

In a recent issue of the official publication of the Housing Department of the Ministry of Health, we see further evidence of the Association's activities in this connection. It states that the Ministry have had under consideration the question of methods of construction of flues for gas-fires, and have discussed the matter with the "B.C.G.A." As one result, the Ministry consider that the following rules should be generally observed: "(1) The cavity of a hollow wall "should not be used as a flue for gas-fires, unless a suitable "shaft is properly constructed therein. (2) If smoothly "finished, the size of the flue for a gas-fire need not exceed "20 in. in area, but should not be less than 18 in. in area, "nor less than 3 in. wide in its narrowest part. (3) All "flues for gas-fires should discharge into the outer air at the "top of the building, so that there may be no danger of back "draught into any room. (4) Additional flues of about 20 in. "in area might, with advantage, be provided as ventilating "flues adjoining fire-flues, with inlet openings near the ceil-"ing." Of course, it will be understood that these suggestions concern rooms in dwellings of the types proposed under the housing schemes; but in more spacious rooms in better houses, in which larger gas-fires and other appliances would be used, the flues would have to be of an area commensurate with the greater volume of the products of combustion. It is understood that the Ministry of Health are preparing for publication further material regarding this matter, in order to familiarize the public and those immediately concerned in the work of design and construction with the requirements under the new order of things. The fresh publication may also contain information as to the sample houses embodying the new form of construction, which the Ministry are now erecting.

This is progress; it is very substantial progress. It is the initial stage in a new order of things. It marks achievement resulting from patient and painstaking labour; and it is the labour of the "B.C.G.A." We have felt for some time past that what the Association and their experts and officials have been doing in this respect has not been adequately recognized in the gas industry. We take this opportunity of making our contribution to that recognition.

House Piping Specification.

IN other columns there are published standard instructions for the specification of gas-piping which have been issued by the British Commercial Gas Association principally for the guidance of housing authorities. These should be useful not only to housing authorities, but to gas undertakings in submitting schemes and making estimates for work. Mr. R. J. Rogers, of Birmingham, has for a long time past been advocating the preparation of something of the kind; but he wants to go farther, and to obtain the legal right for gas undertakings to prescribe and inspect piping installations. We think it is a pity the matter was not dealt with in the Gas Regulation Bill. Such a legal right would be much better than all the carbon monoxide and inert restrictions which the super gas refiners have been ardently seeking to have imposed on the industry. Sound and adequate piping should be the order in these days when gaseous fuel is breaking out into a largely extended use, and will, we believe, make immense inroads into the use of solid fuel. The instructions were, before publication, submitted for suggestion and approval to various authorities in gas distribution and house piping, so that they are presented to gas undertakings and housing authorities with the very best of guarantees.

Fuel for Motor Transport.

MECHANICAL road traffic is growing all over the world. It is a movement that cannot now be stopped; and it would be folly if this country did not betimes look to those days when imported motor fuel will be a diminishing quantity, when it will not meet the demands, and when the balance will have to be made up by the home production of substitutes. Prudence, too, urges that submarine warfare should be taken into account; otherwise one of the lessons of the war will have been lost. Home troubles also suggest good stocks. The home production of a fuel in sufficiency is a problem yet unsolved. All sorts of proposals have been made to render this country more or less independent of imported motor spirit—some by enthusiasts and some by visionaries. We welcome them. But they cannot all be accepted; and it requires a competent tribunal to investigate and to sort-out the good from the bad, by ascertaining their practicability or otherwise. The country is fortunate in having such a tribunal in the Fuel Research Board, with Sir George Beilby as Director. It pays to spend money in preventing vast waste; and it pays to determine which is best before there is any launching-out on heavy expenditures. The Board have issued an interim report upon their investigation into the provision of fuel for motor transport, which is being conducted by a small permanent organization that has been formed by them. In this report the position of benzol, alcohol, and this country's natural source of heat and power—coal—are separately dealt with. It will be noticed that not one of these sources is condemned on the ground of soundness, given proper conditions; but current practicability and sufficiency come into the question. Take benzol supplies. They can only be regarded as supplementary to other sources of supply. The current supplies are only equal to 8 p.ct. of the requirements for motor purposes; and the maximum output of a year during the war would not have been equal to more than 17 p.ct. The view of the Board is that benzol and light naphtha are so relatively costly that they ought only to be used for air transport, or for the lighter and swifter forms of road transport. For heavier forms of transport their use is wasteful and unnecessary. The producers of benzol would not mind this limitation, provided it did not affect their commercial interests; for it has been proved conclusively that there is more power in benzol than in petrol, and that at the existing comparative prices it pays to produce it—especially where coal supplies are good in quantity and quality. Moreover, if and when alcohol is produced for motor purposes, it will be the best of liquid hydrocarbons to mix with it to give it the necessary suitability.

But when will alcohol be produced in paying quantities for motor purposes? When will it pay to produce it for those purposes? Those who in this matter have been soaring high in thought and hope have been picturing the possibility as being close to materialization, with effort and encouragement put into it. The Board in this report drag them down to earth again, and face them with an examination of the question from the economic standpoint. They will be greatly disappointed. But it is no use courting disaster through operating in unfavourable conditions. None of the raw materials can be produced in this country in sufficient quantities or at a price to enable them to be used in making alcohol for motor use on a commercial basis. The food value of vegetable substances is too high for this; and if our Colonies or other parts of the world grow the substances, it would pay better at the present time to sell for human consumption than to manufacture into a product for motor consumption. Besides freightage is at a prohibitive rate. The day may come when these

things will change, and practicability will arrive; but that day is not immediately at hand. The extraction of ethylene too from gas is only in the experimental stage; and the original estimates of the cost of production have been more than optimistic. Thus it is that the time has to be bridged —and no one knows the length of that time—between the present and when conditions will have undergone such a change that the current impossible will have become the then possible.

So at present we are left to our own resources. Coal is the largest and cheapest source of fuel for transport purposes. The Board urge that the utilization of coal and its products for transport should be encouraged in every possible way; and they point out that from the thermo-dynamic point of view the availability of thermal units in the form of gas is at least as high as that of the thermal units in the form of petrol. But there comes in that perpetual barrier of the container. Petrol and benzol are in more convenient form for carriage. The report should re-energize and revive the interest of investigators and inventors in the gas-container question. It is pointed out that town gas and coke-oven gas for omnibuses and passenger cars would be eminently suitable if light and safe containers could be developed, and refilling stations be established on the principal roads. But it is clear that for general purposes, the Board's investigators have in view a carbonizing process working at about 600° C. Attention was called to this by Sir Dugald Clerk at the last meeting of the Institution ["JOURNAL," June 8, p. 628]; and, in the present report, Sir George Beilby refers to this as a "sorting-out" process—a process for sorting-out the various products of coal. The gas would have at least double the calorific power of ordinary town gas; and, according to the statement in other columns, it could be compressed to a remarkable extent, and containers of less size would be required in relation to the B.Th.U. content. The investigators may be asked to transfer their attention from the container to the motor, and let us know whether there will, with such a high-grade gas, be any pre-ignition or other troubles. However, taken as a whole, the report is directive as to the lines of possibility; and the extracts should have the closest study of all concerned.

Funds of the "B.C.G.A."

Organizations that depend upon voluntary contributions for support are having a bad time through the funds not going so far as they formerly did. We cannot say that this year the British Commercial Gas Association are relatively to 1914 doing badly in the amount of their income; but relatively to what the incomes would do in the respective years they are not nearly so well off. All business men must realize this. In every direction expenditure has increased. Everything that is done costs more; and the claims are greater now. The gas industry could not afford—it is of vital importance to the whole future—to neglect following-up the housing scheme in every influential quarter, or to let an opportunity slip. This essential work has made great inroads upon the funds of the Association; and it is therefore important that, if activities are to be maintained at the requisite level, and if full value is to be obtained, the funds must be of an order that will enable the work to be done. Some remarks on the subject of supplementing funds are made in the report published in our news columns; and we hope they will not go unheeded. But whatever the value of the available funds, this we can testify—the earnestness of the prime movers in the organization is always of superlative quality.

Direct Labour and War Memorials.

At many gas-works consideration is being given to the question of a fitting memorial to the men formerly employed on them who fell in the war. We heard in conversation the other day that a proposal has emanated from the Beckton tar works of the Gas Light and Coke Company that the heavy cost might be reduced by direct labour. We do not know whether the idea will be materialized by the Company and their men. But anyway the suggestion is one that could be developed in many places. A gas company, for instance, might find the necessary materials, and a design might be jointly determined; and why should not the men do their part in the erection as a labour of love, and as showing their sincerity in honouring the memories of their late comrades? Where this is done, there will be pride among the men over their work, and over its maintenance.

Wages and Value of Production.

The alarm has been sounded. Labour must stay its hand; for the prices of production have reached a level which causes a selling price at which demand is beginning to decline. This is only the natural order of things. The capacity of a person to buy is limited by his pocket; and the incentive to buy is limited by the value to him of the thing. When the one or other or both limits are reached, the person must reduce or cease buying. The trade unions connected with the engineering, foundry, and shipbuilding trades recently sought an advance of 6d. per hour. The hour-rate does not look so imposing as the week-rate; and so 6d. an hour was asked for. Present payments above the pre-war rate are 39s. 6d. *plus* 12½ p.ct. on the total earnings in the case of time workers, and the advance to piece workers is approximately equal. The Industrial Court have declared that, after consideration of the case submitted to them, they find the claim for an additional 6d. per hour has not been established. In their previous decision on the claim by the same Unions, the Court expressed the view that, in ordinary circumstances, the most important consideration in deciding whether an alteration in the rate of wages should take place was the value of the work done in its relation to the state of trade. At that time, in the view of the Court, the state of trade was such as to justify an increase in rates. But they cannot find that the position to-day differs to such a degree from what it was four months ago that the settlement effected by the last decision should be disturbed—as a matter of fact, they find indications in some branches of the industry of a falling-off in demand. The consumer or user of the productions is getting "fed up;" and labour will now begin to feel the recoil.

The Miners' New Claims.

The Miners' Federation representatives have seen the Coa Controller, and presented their claims for a 2s. per day advance for workers of 18 years and upwards, 1s. for those from 16 to 18 years, and 9d. per day for those below 16 years, as well as for a reduction of 14s. 2d. per ton in the price of household coal. A reply is expected early this week, and then a further meeting will be held—probably to-day. Meanwhile, the Board of Trade have issued a peculiarly interesting statement. It deals with the causes which have combined to raise the price of coal; and they are comprised under production, conveyance, and distribution. In 1914 wages represented a cost of 6s. 2·92d. per ton; while in the quarter ended March 31, 1920, they were 22s. 8·5d. per ton. From March 12, 1920, the miners were granted a further increase —viz., 20 p.ct. on the gross earnings (excluding war and Sankey wages), with a minimum increase of 2s. for workers of 18 years and over for each shift per day worked, 1s. for those of 16 to 17 years, and 9d. for those of 16 years. This is estimated to represent an average increase of 2s. 10d. per ton in the cost of production. Costs of stores, timber, management, salaries, and general expenses were, in 1914, 2s. 1·45d. per ton, and in 1920 (quarter ended March 31), 6s. 2·69d. per ton. The rates charged by railway companies for the conveyance of coal were increased by 25 p.ct. from Jan. 15, 1920. Wagon hire has been raised from 1s. to 1s. 6d. per ton since 1914. Average prices at the pithead in 1920 showed an increase over 1914 of about 230 p.ct.

New Levels in Workmen's Compensation.

A considerable number of our readers engaged in manufacture will be interested in the report of the Committee appointed by the Home Secretary to inquire into the system of compensation for injuries to workmen. The Committee propose large increases in the amount of compensation payable; and while the idea of State insurance has been rejected, it is intended that the profits of insurance companies and mutual associations shall be rigidly controlled. It is probable that legislation will be submitted at an early date to deal with this matter. If the scheme is adopted, every employer, other than the Crown, local or other public authority, a statutory company, or a householder in respect of servants not employed by him for the purpose of his trade or business, is to be required to insure against workmen's compensation risk. The Act of 1906 is to be extended so as to bring new classes within the scope of the Act, including persons employed otherwise than by way of manual labour whose remuneration is at a rate not exceeding £350 a year, instead of £250 as under the existing Act. With regard to benefits, these are on a

high scale compared with the old. Payments are proposed rising from £250 when a widow is left without children to £800, when a widow has a child or children and there are other total dependents. The maximum benefit for total disablement it is proposed shall be increased to £3 a week. Values in everything are higher to-day than when the 1906 Act was passed; and so it follows that compensation like wages should be on a higher scale. But this brief reference shows that the scheme provides for a heavy increase in the liabilities in this regard. The Committee contemplate compulsory insurance; but some arrangement should be made so that employers are not charged too much for the protection. An agreement has been effected with the Accident Offices' Association which ensures that workmen shall receive in benefits 70 p.ct. of the premiums, leaving 30 p.ct. to cover commission, expenses, and profit. The next step will be the proposals of the Government for the amending legislation; and the succeeding one will be the changes that Parliament will make during the passing of the measure. At the moment there is nothing more definite than recommendation to guide as to what will be the final conditions of the new lines and levels of compensation.

Earth Current Troubles in Gas-Works.

The dangers of stray earth currents in gas-works was the subject of an article by Mr. H. C. Widlake in our issue for July 7. In that article not only were the dangers pointed out, but suggestions were made as to how to obviate them. Mr. C. F. Tune, in our "Correspondence" columns to-day, expresses the hope that Mr. Widlake's article will not cause undue alarm to gas managers, but he too shows the positive need there is in gas-works for proper expert installation, in order to avoid trouble. In his view; no earthing system is beneficial or adequate in gas-works; and he gives his reasons. Mr. Tune, we know, had some years' experience with a telpher plant installed on the earth system. It was a plant that was probably a decade old; and it was a constant source of difficulty through the motors of the stoking machinery having to stand the extra insulation pressure due to the telpher earthing. It will be interesting to have not only Mr. Widlake's comments on Mr. Tune's letter, but experiences on this important subject from other readers.

Corporation Tax and Statutory Companies.

Light has broken into the mind of the Chancellor of the Exchequer in regard to the levying of the proposed new corporation tax upon public utility companies whose finances are already governed by Acts of Parliament. The information that has been laid before him, and the pressure that has been brought to bear, have convinced him that it would not be just to bring the tax immediately into operation in the case of such companies; and therefore he is proposing, on the report stage of the Finance Bill, to insert words which will suspend for three years the operation of the tax in respect of these companies. By that time, it is expected that statutory companies will have had their legislative limitations revised; and then Parliament will be able to review the position of the companies in relation to the new tax. This concession was announced in the House yesterday week.

Gas Oil Imports.

The imports of gas oil for the past six months looked-up considerably, compared with the first half of 1919. The quantity received was 30,653,170 gallons, which contrasted with only 10,078,966 gallons in the corresponding six months—an increase of 20,574,204 gallons, or 204 p.ct. It is noticed that the quantity of motor spirit diminished considerably; the amount imported being 89,917,812 gallons, compared with 113,572,545 gallons. On the other hand, fuel oil improved by rather more than 20 million gallons—the quantity landed being 143,423,339 gallons, against 123,510,896 gallons.

Trade Unions and Democratic Government.

The scattered trouble with gas workers over the terms of the recent agreement as to wages and holidays, and the fresh demands of the coal miners, are not the only matters which are of immediate concern to the gas industry in relation to the continuity of gas supplies. At a special sitting of the Trade Union Congress last week, resolutions were passed (of a totally distinct character), respectively proposed by the National Union of Railwaymen and the Miners' Federation, which commit the Congress to test, by a general vote of all the Trade Unions, whether they shall endeavour to compel the Government to do their bidding in respect of Ireland—thus involving the whole fabric of constitutional Government. The compulsion, it is understood, would take the form of a general strike in all industries. The intention is that Government troops are to be withdrawn from Ireland; and the production of munitions of war destined to be used against Ireland and Russia is to cease. So Ireland is to be left to sedition and murder; and those people of Ireland who desire to live peaceably are to have no protection from the Government. The workers of this country should give emphatic expression to their resentment over the growing folly of their leaders by sending them to look out for jobs for which they are better fitted than they are showing themselves to be for generalship and clear thinking. We hope the members of the unions will make an unmistakable declaration against this interference by their leaders in matters that must be dealt with by a Parliament elected on the broadest possible franchise.

PERSONAL.

Mr. THOMAS GLOVER, one of the Directors of Messrs. Alder & Mackay, Ltd., has been appointed their Managing Director for London and the South of England.

Mr. J. H. BORASTON, C.B., O.B.E., has been appointed a Director of the South Suburban Gas Company, to fill the place of his father, the late Sir John Boraston.

Mention was made in last week's issue of the retirement of Mr. J. H. METHVEN, who had for two years been Resident Engineer at the Bromley-by-Bow works of the Gas Light and Coke Company. In all, Mr. Methven (who is 48 years of age) has had 32 years' service with the Company—starting as a pupil under the late Mr. John Methven at Nine Elms. He became a Junior Assistant to the Engineer at Beckton in 1892, and four years later was appointed Assistant Engineer at the Bow Common and Silvertown Stations. After being transferred as a Senior Assistant Engineer to Beckton in 1906, and to Kensal Green in 1910, Mr. Methven in 1913 was appointed Resident Engineer at Kensal Green, in succession to Mr. C. A. CUNNOLD; and he moved from there in 1918 to take a similar position at the Bromley works.

Mr. WALTER CHANEY, who retired in the early part of this year from the position of Engineer of the Saltley Gas-Works of the Birmingham Corporation, is practising as a Consulting Engineer, at Eldon Street House, Eldon Street, London, E.C.

Mr. D. R. STEUART, F.I.C., F.R.S.E., who for over forty years was Chief Chemist to the Broxburn Oil Company, Ltd., was on the occasion of his recent retirement presented with an illuminated address and gift of money as a token of respect from his many friends in the oil trade.

OBITUARY.

The death occurred in a nursing home at Reigate, on the 14th inst., of Mr. GEORGE MEAD-ROBINS. The deceased gentleman was formerly Engineer and Secretary of the Sutton (Surrey) Gas Company, which position he resigned at the beginning of 1914.

Mr. ALEXANDER MACKAY (the Chairman of Messrs. Alder and Mackay, Ltd., gas-meter manufacturers), who died on the 12th inst., at his residence in Edinburgh, had throughout the greater part of his life enjoyed splendid health, though during recent months he had been more or less confined to the house. His death came with great suddenness, from heart failure. Born in Ross-shire, and educated at Dingwall Grammar School and Tain Academy, he began his business career in the service of the Caledonian Banking Company. It was in 1871 that he joined the late Mr. Henry Alder in the business of gas-meter manufacturers, whose record went back through various stages to a period previous to 1850, when Mr. Alder had been with Messrs. Cochrane & Co., who were well-known meter makers of that day. Messrs. Cochrane's business came to an end over sixty years ago. Upon Mr. Alder's death, Mr. Mackay assumed as a partner the late Mr. Joseph Bennet; and later on Mr. Mackay's brother (Mr. John Mackay) and Mr. Bennet's son (the late Mr. John H. Bennet) were taken into partnership. The firm was converted into a limited liability company in 1916—Mr. Mackay being appointed Chairman. As "JOURNAL" readers are aware, Mr. Mackay was a prominent personality in his day; and his genial manner made him friends wherever he went.

The Gas Light and Coke Company's Dividend.

The Secretary of the Gas Light and Coke Company (Mr. W. L. Galbraith) informs us that, subject to audit and to the approval of the Board of Trade, the Directors of the Company have declared dividends for the half year ending June 30, at the rate of £2 12s. 6d. p.ct. per annum on the 3½ p.ct. maximum stock, and at the rate of £3 p.ct. per annum on the ordinary stock respectively.

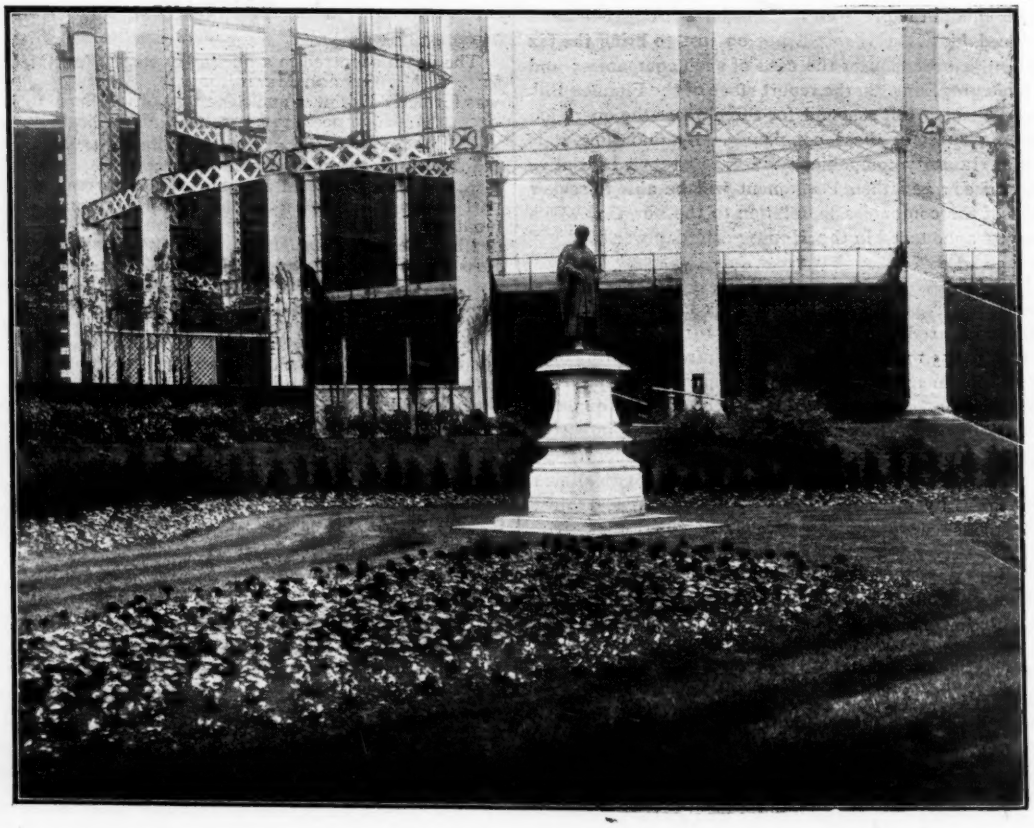
STATUE TO THE LATE SIR CORBET WOODALL.

To the right-hand side of the main road leading through the vast Beckton works of the Gas Light and Coke Company, with two gasholders forming the background and facing others on the opposite side of the roadway, there stands to-day a life-like statue of Sir Corbet Woodall, J.P., D.Sc., the late Governor of the Company. Trellis work at the rear, and saplings and shrubs, with beds of beautiful geraniums and violas in the grass carpeted surroundings, form the setting of the statue, which is the work of Mr. A. G. Walker, whose artistic gifts, as the Governor (Mr. D. Milne Watson) told us on Monday at the unveiling, gave the nation the beautiful statue of Miss Florence Nightingale at the foot of Regent Street. Sir Corbet is presented in the academical robes with which his D.Sc. degree invested him. The sculptor, though he did not know his subject in life, has reproduced what all who knew Sir Corbet pronounce to be life-like facial characteristics. It is in fact a speaking likeness of Sir Corbet in contemplative mood; the attitude is easy, as becomes one who was ever at home and at his ease in whatever the surroundings or circumstances, and whose watchfulness, tact, skill, and determination, were always mingled with a courtesy and good nature that were innate, and so inseparable traits in all his doings.

There is great appropriateness in the erection of this statue. It was fitting that the Company should have erected it, because he was the fount of its regeneration. It is fitting that the statue has been erected at Beckton, because although Beckton cannot to-day be regarded as all that modern gas-engineering says it should be owing to the binding lines of the now distant original plans, there is great scope there as opportunity permits for engineering developments within the limitations for which the present Chief Engineer (Mr. Thomas Goulden) has no shadow of responsibility. It is fitting that the statue should be at Beckton, because there is the greatest concentration of the Company's army of workers, whose interests were a constant thought of the late Governor, and it was to his instrumentality that co-partnership within the Company owes its birth. When he became a convert to the

principles of co-partnership, his ardent advocacy vied with that of his predecessor in the work—Sir George Livesey; and this advocacy was welcomed and highly valued. His face, figure, voice, too, were well known among the men of Beckton, as among the men at the stations of less magnitude. The presentment of figure and face will remind them of Governor and friend, of one whose sterling character remains an example, and of one who worked with the view of finding in the results of work something accomplished — something better than when he entered upon it. He thought and worked with an object; and whatsoever his mind or hand found to do, he did it with all the power with which his diverse qualifications invested him. It was fitting, too, that Mr. Milne Watson should have been asked by his colleagues to unveil the statue; for in the vast work of the Company, no two men had greater intimacy than Sir Corbet and the then General Manager, and now successor in the Governorship.

Before the unveiling took place on Monday, the Governor and Directors entertained a few friends, together with the chief officials, at lunch on the works. All the Directors so far as one could see were present, and so were the chief officials of the various departments. Mr. Goulden was there, and so was Mr. W. L. Galbraith, the Secretary, as well as his predecessor (Mr. H. Rayner), Mr. F. W. Goodenough, Mr. H. E. Ibbs (Chief Accountant), Mr. W. B. Leech, the Resident Engineer at Beckton, Mr. W. Gordon Adam, the Superintendent of the Beckton Tar and Ammonia Products Works, and several others whom we did not know personally. Sir Daniel F. Goddard was there as a Director; but he was also a colleague on the Board of the Tottenham Light, Heat, and Power Company, and successor of Sir Corbet in the chair of the Company. Mr. A. E. Broadberry, who worked so long with Sir Corbet at Tottenham, and Mr. Charles Hussey, the Chairman of the Croydon Company (of which Sir Corbet was a Director), were also among the guests. Mr. Charles Hunt was there as an old professional friend. Mr. Walker, the sculptor, was also one of the guests. We could lengthen the list; but the line must be drawn



somewhere—not, however, until mention is made of the presence of Mrs. Milne Watson, and members of the family of the late Governor. There were Mr. and Mrs. Corbett W. Woodall, Mr. and Mrs. Henry Woodall, Mr. G. H. Woodall, Mr. and Mrs. H. W. Woodall, and Mr. and Mrs. J. C. Woodall. There were the daughters: Mrs. Knight, Mrs. H. B. Figgis, and Mrs. H. Margetson. Mr. Figgis and Mr. Margetson were also present.

There were no speeches at the luncheon; and from the room the Governor and guests walked to the scene of the function which had brought together men and women who had honoured the late Governor, and would not neglect any opportunity of doing honour to his memory. It was a wonderful scene of unity. Every grade of the Company's service was represented—from the Governor and Directors, through the officials chief and subordinate, the foremen, and the workmen. The Workmen's Committees were there, and so were the members of the Co-Partnership Committee. The administrative and outdoor departments had their representatives. It was a great mass of men, with the small sprinkling of ladies who occupied the space in front of the statue, and the grassy slopes of the gasholder tanks, and other vantage points in the neighbourhood.

There was silence as the Governor ascended the small temporary platform near the base of the memorial. Having mentioned that he had been asked by his colleagues to unveil the statue, and that it gave him the greatest pleasure to do so, he performed the little ceremony; and as the well-known features were revealed, there were hearty cheers from the men; and in those cheers there sounded a welcome not as to one who has departed, but as to one who lives sacredly in memory.

The GOVERNOR (proceeding) said: Ladies and Gentlemen, this beautiful statue which I have now unveiled is the work of the distinguished sculptor, Mr. Walker, whose statue of Miss Florence Nightingale at the foot of Regent Street so many of you know. The statue has been erected here as a reminder for all time of the work done by the late Governor for the Company. Sir Corbet Woodall joined the Court of Directors in 1897, when the fortunes of the Company were in jeopardy. In 1906 he was elected ninth Governor of the Company, and held that post until his death in 1916. During these ten years the Company made remarkable progress, and recovered from the temporary set-back in its fortunes. Sir Corbet Woodall was a great man, and would have made his mark in almost any profession. He and Sir George Livesey were the twin stars in the gas firmament for many years. No doubt, Sir Corbet Woodall could have achieved fame in any sphere, but he devoted himself to the gas industry, and became one of its greatest administrators. He devoted himself unsparingly to the service of the Chartered Company (to use its old name). With him to encourage and guide, the works were modernized, the service to the public was improved, the workers were given a living interest in the affairs of the Company by the introduction of a co-partnership scheme. In a word, the backward Company became progressive. This was not achieved by hard work alone. It was rather by his ability to inspire everyone with his inborn idealism. He believed in the great possibilities of the Company; he believed in the officers who worked with him; he believed in the men who worked for the Company; and he got the reward of his faith. He inspired confidence; his presence made men feel they were on the winning side; problems seemed less complicated when he attacked them; the outlook seemed less gloomy. In short, his idealism was an inspiration to all. He believed in himself; and he also believed in others. He could not understand a man not doing his best; and so he turned the doubters into enthusiasts, and the week-kneed into strong men. Behind all this, of course, was indefatigable industry, energy, will-power, and great clearness of vision, in addition to which was added in a supreme degree the gift of tact. There was yet another quality which made for success, and that was the very rare gift of being ready as an old man to accept new ideas. His mind in this respect was quite fresh to the end, and those of us who had the privilege of working with him will always remember the keen and sympathetic interest he took in all new projects. While he respected the old, he never let his respect interfere with the adoption of the new if it showed an improvement. He was beloved by the men; for he always considered them, and tried in every way to make their lives more comfortable, their tasks easier, and to give them a feeling of responsibility in their work. His interest did not cease with the Company's work; he also showed practical sympathy in the sports, flower shows, and other efforts to bring the workmen together, and to brighten their lives. He took the greatest interest in the territorial movement, and did much for the "Rangers;" and I do not think there was any honour (and he had received many) he appreciated more than the honorary colonelcy of the battalion. He also associated himself with the scientific work of the industry, especially at Leeds University, from which he received the honorary degree of Doctor of Science. I have spoken of him chiefly as Governor of the Company because that was the side of his life of which I saw most. A great deal could be said of his general professional work; and there was no one more sought after for advice and counsel than he was. I might speak of his exceptionally happy home life; but I feel that in the presence of his family this would be out of place. He endeared himself to a wide circle of friends; and he was always ready to give help and advice to anyone in difficulties. His generosity and hospitality were known to all. The statue has been erected at Beckton because if there was one place more than another that he loved in the Gas Light and Coke Company, it was Beckton. He constantly visited it; and it was never far from his thoughts. He once said that he hoped his memory would be kept green; and I have no doubt that this beautiful statue will serve as a reminder to future generations of what Beckton and the Company owe to him. [Cheers.]

Mr. RAYNER (foreman blacksmith at the Kensal Green works) remarked that the whole of the workmen appreciated the kindness of the Governor and the Directors in asking them to be there that afternoon to take part in this ceremony. Sir Corbet Woodall had great and good intentions when they started in their Company the co-partnership scheme. His real work was to bridge the gulf that existed between capital and labour; and anyone who bridged the gulf deserved the gratitude and the respect of every man and woman. Everyone present realized that Sir Corbet did do something to that end.

Mr. CARWELL (Beckton) also added a few words. He said the time was quite fresh in memory when, with other delegates, he met Sir Corbet Woodall on some particular business; and they soon found they were dealing with a gentleman. His impression was that he was a faithful and fearless man; and if they looked well into these two words, it would be found that they contained a depth of meaning. He hoped sincerely the Company would go on in the same way that it had been doing.

Then the men called for Mr. Goulden; and they were not to be deprived of the fulfilment of their wish. So much was this so, that he was escorted to the platform; and when there a few words were inevitable.

Mr. GOULDEN said he was sure all present could bear testimony that greatness had been thrust upon him. However, he was very glad to have been "pushed" into the position, because it showed something of which he was very proud—that he was on very good terms with all his fellow workmen. They had had a good many years together; and they were all working men, though some worked with their brains, and some with their hands. The men who worked with their hands had their work limited to eight hours a day; the hours of the men who worked with their brains were unlimited. ["Bravo" and laughter.] It was difficult for him to look up to the statue of his late chief without very deep feelings of emotion. They were gathered there that day to do honour to him. The Governor, in graceful and fitting terms, had unveiled a monument to one who was certainly a great man; but he (Mr. Goulden) would also like to bear testimony to the deep feelings of affection that they all entertained for Sir Corbet. Everyone (himself among the number) who came into contact with him was inspired by him. Through a long term of years he knew him—from the time when he (Mr. Goulden) was quite a boy at the old Phœnix Gas-Works; and he was always the same throughout his life. He never hesitated to tell them of their errors; and he was for all of them in the gas engineering profession (it might be said) a human signpost, though he not only showed the direction in which they should go, but he set the pace, and they were expected to follow it. He was a true friend to him (the speaker), and not less was he the true friend to all others. When he came to Beckton, he should now feel that he was again walking with Sir Corbet. It was a place that he liked so well. The statue would be an inspiration to all who came down from time to time, as well as to the men who lived their working hours there, to follow the path of duty which he himself so fearlessly trod. They could not do better than follow the example that he set them.

There was a vote of thanks to the Governor, and cheers for Mr. Goulden. The large company then pressed round the statue to obtain a nearer view. In the keeping of Beckton and its men, the statue will remain as a precious possession.

The statue is in bronze, and was cast by the Italian method called "wax lost"—*cira perduta*. It is 7 ft. 4 in. high with the bronze plinth, and is carried on a Portland stone pedestal (with one step), 9 ft. 6 in. high from its concrete bed. The inscription on the face of the pedestal reads:

SIR CORBET WOODALL,
M.I.C.E., D.Sc.,
Hon. Colonel of the Rangers,
Governor of the Gas Light and Coke Company,
1906—1916.

"An Introduction to Chemical Engineering."—Mr. A. F. Allen, B.Sc.Hons., F.C.S., LL.B., Capt. R.A.F., has just written an elementary text-book for the use of students (who have received a fair grinding in the science of chemistry, together with the correlated subjects of physics and mathematics) and users of chemical machinery, the object of which, as explained by the Publishers, is to serve as an introduction to chemical engineering by familiarizing the student with those types of machines which are in general use in the chemical industry. The plan is to take the various pieces of apparatus in common use in chemical laboratories, and describe their industrial counterparts. In this way, the reader's already fair knowledge of the theory of chemical engineering is brought into union with modern practice. One of the chapters deals with transport—an important matter in the chemical industry of to-day. The book is published by Sir Isaac Pitman & Sons, Ltd.

Society of British Chemical Manufacturers.—The fourth annual meeting of this Association, which was held on the 8th inst., in the rooms at Burlington House of the Chemical Society, was presided over by Mr. R. Grosvenor Perry, who, in moving the adoption of the report, said they had never felt that the election of a chemical plant manufacturer to membership was intended by the spirit of their Articles of Association. They had therefore organized a small Association of Chemical Plant Manufacturers, which they hoped to affiliate with their own. Mr. E. V. Evans remarked that the question of chemical engineering was one with which the Association had decided to deal vigorously. When the mission were in Germany, there was evidence in every direction that chemical industry there was most wonderfully catered for by the chemical engineering industry; and they were led to the conclusion that the engineer is quite as important a person to chemical industry as is the chemist. Mr. Kenneth Chance urged the desirability of private and informal discussions between manufacturers of plant.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A MEETING of the Central Executive Board of the National Gas Council was held on Thursday last at No. 30, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair.

It was reported that the Gas Regulation Bill had passed its second reading in the House of Lords, and that the Committee stage would be taken in the House on the 15th inst. [This has since been postponed to the 22nd inst.]

The formation of a Coal Advisory Committee of the Council was reported, to confer with the Coal Mines Department upon all questions dealing with coal. The legislation proposed by the Ministry of Mines Bill was also discussed.

It was reported that the National Sulphuric Acid Association had asked that a Joint Conference of the Association and the Council should meet shortly to discuss various matters relating to the purchase of spent oxide from gas undertakings.

The question was mooted of an "Exhibition Fund" to be levied on the industry, for the purpose of defraying expenses in connection with a national representation of the gas industry at the various exhibitions that were held all over the country from time to time. After discussion, it was resolved to refer the matter for consideration to the British Commercial Gas Association and the Society of British Gas Industries.

A letter from the Scottish District Executive Board of the Council with regard to the proposed new standard sizes of dry meters suggested by the Committee on Gas-Meters of the Institution of Gas Engineers was referred to the Institution.

With regard to the standardization of gas cookers, it was reported that completed questionnaires had been received from the South Wales and the Scottish Districts of the Council.

It was decided to renew the Council's annual subscription to the Federation of British Industries.

The retirement of Mr. Samuel Glover from the Central Executive Board, as representing the Institution of Gas Engineers, was reported, in favour of Mr. J. D. Smith, of Belfast.

ELECTRICITY SUPPLY MEMORANDA.

THE Electrical Press and the electricity industry cannot get over their astonishment at the resolution of the Sheffield City Council, to set their own Electricity Committee and Engineer right regarding the superiority of the plan of charging on a uniform basis for electricity used for power and lighting. The decision was come to at the instance of Mr. Councillor J. G. Graves, who still, in spite of all criticism, cannot see anything impracticable or unreasonable in what he proposed and the Council have done; and until he can be shown that it possesses one or the other or both characteristics, he is disinclined to think that there is any unwisdom in it. The decision has caused quite a lively interest in municipal circles concerned in the supply of electrical energy, because on all hands it is confessed that the time is rapidly approaching (we think it is already here) when the absurdity of having percentage increases distinct from pre-war prices, or of continuing the percentages, can no longer be adhered to. We are rather inclined to the view that electric power users themselves will have a very large say in determining whether lighting and power charges shall occupy one level. The power users of Sheffield are bringing pressure on the Council to rescind their decision. A meeting was held by them soon after the passing of the resolution; and the decision was then subject to very stern protest. To bring about an equality between power and lighting in regard to price means a lowering of the lighting charges and a raising of the power charges; so the consumers for lighting purposes are not remonstrating with the Council. The manufacturers naturally say that extent of custom, duration of use, and so forth, should be (as they have been hitherto) taken into the calculation; and they do not feel disposed to pay the Corporation a fraction more than is necessary to remunerate them for the power service. If the Corporation adhere to their decision, it will have an effect that they did not anticipate, and that will not be desirable in the interests of the Electricity Department. A great many firms have scrapped schemes for producing their own electric power, not because they could not produce electrical energy *in situ* more cheaply than the Corporation can produce and distribute it, but because it is more convenient not to have the trouble of production. Now the manufacturers are beginning to consider the question of retracing their steps to individual production, or better still, where works adjoin, by working co-operatively. At the meeting of the manufacturers, it was stated by a representative of Vickers, Limited, that the proposed change would mean an increase of the current charge for power from 1·16d. to 1·44d. per unit, or a 24 p.ct. advance. These considerations show that if the Corporation adhere to their resolution, one effect is bound to be loss of power custom and an increase of the lighting custom; and as this change proceeds, it will mean that the level charge for power and lighting will have to ascend.

Departure from Accepted Principles.

An Investigation to be Made.

There are, however, signs that the City Council are getting disturbed over the matter, though reluctant to make any hasty retreat from their resolution as to levelling the charges for current. At the meeting of the Council on Wednesday last the Electricity Committee tried to induce the members to rescind the objectionable resolution, and to sanction the increases formerly recommended by the Electrical Engineer, as endorsed by the Committee. The dangerous policy embodied in the resolution for producing uniformity was pointed out. But the obdurate Mr. Graves saw no reason for departing from it, and moved that a Special Committee be appointed to draw up the lines on which effect should be given to the policy. However, there was quite a perceptible feeling in the discussion that members were uncertain as to whether or not a false move had been made; and in the end a motion by Sir William Clegg gained acceptance, which empowers a Special Committee to investigate the whole question—permission being given them to obtain any necessary advice and assistance to enable them to make such recommendations to the Council as may be expedient. We will not prognosticate the result of the inquiry; but a guess with confidence attached to it can be made.

Descent to Crudity in Tariff Making.

At the same time, there is nothing very astonishing over the departure of the members of the Sheffield Corporation from the long-cherished rules that formerly governed the settling of electrical tariffs. Electrical engineers have been setting town councillors a very bad example. At one time they boasted that every charge made for current was worked out on a scientific basis to the finest of decimal points, and that all the factors bearing upon costs were taken strictly into the calculation. Then tariffs were said to be determined with mathematical exactitude, which in so many cases proved defective in that the net result over the whole operations of a year so frequently showed deficits. But the days of such scrupulous nicety, if unsound in the final results, have now passed. From an assumed scientific accuracy, electrical men have fallen, in the matter of tariff-making, to crude and absurd practices. What on earth has rateable value, or floor area, or number of rooms in a dwelling or other building got to do with the costs of generating, distributing, and supplying electricity? But these very men who once boasted that all their tariff movements had scientific guidance, have dropped into these queer practices. "Electrical Industries" excuses them. The supply undertakings have been "scientific overmuch." "There is no definitely ideal system." "Compromise of some kind is necessary between technical purity and practical usefulness." Very well, if it were necessary to abandon scientific rule, then it would be better to find and apply a basis of charge with at any rate some relation to the cost of putting the commodity into the possession of the user. Unfortunately, the commercial values of electricity for the various purposes for which business is sought are so wide apart that the industry could not hope to make much progress if it adopted a common basis of charge. For instance, if the charge for electrical energy for power was that for light, the power business would soon vanish, for fractions of a penny per horse power count with manufacturers. Electricity for heating purposes at general power prices finds itself up-against the stone walls of much cheaper competitors; and its own load of deficiency in heat value for money expended hampers progress, and causes many a back-sliding, despite the weight that the Electrical Development Association and Mr. Beauchamp bring to bear, in trying to prevent any retrogression and even to gain a little more ground forward.

Electrical Men and Coal Fires.

It is remarked that, in the discussion on Mr. Beauchamp's paper on tariffs (which was noticed last week), Mr. L. L. Robinson, of Hackney, is reported by "Electrical Industries" to have said: "People have not entirely given up the use of coal fires; and it is not to the interest of electric supply undertakings that they should do so." There is a wealth of meaning in these words. Electricity at a fraction of a penny per 3420 B.Th.U. would not induce the masses of the people to give up coal for electricity. If they did, the use of electricity for room heating for four or five months of the year would demand so much in the way of capital expenditure for generating and distributing plant, and the charge would have to be of such ample dimensions for the short-period service, that the pace at which electricity would send users to the bankruptcy court would be very much quickened. There are all sorts of reasons why Mr. Robinson may have said that it was not to the interest of electricity supply undertakings that people should give up coal fires. We will not quote them. No doubt one of them is that electrical men have no wish to see gas suppliers materially strengthened by their securing the greater part of the heating business which they are so much better capable of undertaking. But the wish of Mr. Robinson that people should not give up coal fires has a very prodigal foundation. Coal for room heating is popularly described as producing pleasant conditions. But it is wasteful of much that is valuable; and it creates labour and dirt. From the advent of domestic coal to the cartage from the houses of the ash and the dirt, the extraction of the soot from the chimneys, and the removal of the soiling effects, coal use calls

for labour and expenditure. It may be to the interest of electricity supply undertakings that people should not abandon coal for heating; but would it not be to the interest of householders themselves and of the nation that the old crude and slovenly way of heating rooms should be abandoned? That is the question; not what is or is not the interest of the electricity industry only.

Gas-Filled Lamps in Smaller Sizes.

Smaller sizes of the gas-filled electric lamps are now on the market. The manufacturers announce the production of low-voltage (100 to 130 volt) lamps of 40-watt size; and high-voltage (200 to 260 volt) lamps of 60-watt size. The former would give approximately 54 candles, and the latter about 80 candles—when new. The cost of the low-voltage lamp is 5s., and of the high-voltage one 7s. 6d. At these prices users will not want to have frequent renewals.

Generation Effficiencies.

Electrical engineers are devoting more attention than ever to the question of the thermal efficiency of generation, though they find comparisons with competitors somewhat odious, and so try to make some compensation for their miserable showing at one end by reference to what happens in the way of efficiency in use at the other end inside the electric-oven or through the radiator—the representatives of the leanest parts of the electrical business. These, however, do not make amends for the heavy losses that occur at the generating end. In a paper by Mr. I. V. Robinson, read before the British Electrical and Allied Manufacturers' Association, on "Power Station Design in Relation to Thermal Efficiency," he advocated the rendering of over-all consumptions of fuel in British thermal units per unit of electricity generated, and not in pounds of coal, and that a maximum of 20,000 B.Th.U. per unit generated be the objective in large stations. The first proposal has something in its favour, as it would facilitate comparisons as to the thermal efficiencies of generation. But beyond this it has little or no advantage over pounds of coal if the calorific value of the coal is also stated. To know both the weight and value of the coal is very helpful in the studies of heat efficiencies. As to the objective of 20,000 B.Th.U. per KW.-hour (3420 B.Th.U.), that is only 17 p.ct. efficiency, which means a waste of 83 p.ct. that cannot be compensated by 100 p.ct. efficiency in the consuming appliances, even if such paragons existed. The 20,000 B.Th.U. would mean only 1·6 lbs. of coal with a calorific value of 12,500 B.Th.U., and little less than 1·5 lbs. of coal with a calorific value of 13,500 B.Th.U. In the discussion there were claims that the objective had been exceeded, and something better was in sight. Mr. W. M. Selvey spoke of 17,500 B.Th.U. being at hand; and Dr. Ferranti predicted that there would soon be stations returning on the switchboard 28 p.ct. or more of the energy of the fuel—still a loss of 72 p.ct. Some years ago, he postulated a thermal efficiency of 25 p.ct.; and matters, he says, are rapidly travelling in that direction. Mr. George Wilkinson is ashamed of an 80 p.ct. loss; and he advocates the introduction of internal combustion engines into steam-turbine stations, so as to secure another 10 to 15 p.ct. From Mr. P. V. Hunter it was learned that a station designed on Dr. Ferranti's lines is being erected on the North-East Coast, using a pressure of 500 lbs. and a temperature of 700° Fahr. The steam is to be reheated in two stages, and the condensation in three. The station has been designed for a thermal efficiency of 24½ p.ct.; and he declares there is little doubt the figure will be attained. But it is only worth while with a station load factor of 80 p.ct. owing to the cost of installation and attendance. Increases in efficiency percentages may not in all stations pay for the extra money expended. Of course, it is a beautiful and consoling thing to picture such efficiencies; but they are only for stations rich in propitious conditions.

The Bill.

Mr. Emile Garcke has a high place in the electricity supply industry. The original Electricity Bill that was introduced last year had not a sympathizer in him; but the abbreviated Bill that became an Act has received his blessing. It gives regulated freedom; and it is a charter. There is thankfulness on his part that the strenuous opposition of the industry, aided to some extent by the commercial community, and more especially by the independent judgment of the House of Lords, succeeded in eliminating the objectionable clauses from the Bill. The action of the Government in reviving these clauses, and binding them together as a supplementary measure, is denounced by him; and he hopes there will be an early abandonment of the policy of the Government in this respect. But it was seen a fortnight ago that Mr. T. Roles, of Bradford, in his presidential address to the Incorporated Municipal Electrical Association, looked upon the new Bill as a necessary supplement to the original Act—in that it would put authority into the hands of the Electricity Commissioners to compel municipal authorities to enter into schemes for the pooling of generating power. There were also the financial clauses that are not liked. The far-seeing ones would prefer not to come under any indebtedness to the Government; for even now many see that the electricity industry under the new Act is in a better condition than ever it was, and will grow more so, for the application of the policy of nationalization, much as it is detested, and much as the Government may deny that they have any visions of this being the end of their present proposals.

COAL GAS AS A MOTOR FUEL

And the Case of Power Alcohol and Benzol.

THERE are few matters at present before the public of equal importance with the housing problem and the question of fuel for motor transport—both of which are likely to be affected by the coming increase in railway charges. In the one case, long railway journeys to and from work are certain to become less popular; and in the other, there will be a strong tendency, where practicable, to divert traffic from rail to road. It is this latter consideration which renders particularly opportune an interim memorandum by the Fuel Research Board on "Fuel for Motor Transport," which has just been submitted to the Advisory Council of the Department of Scientific and Industrial Research, and approved by them. At an interview with representatives of the Press on Thursday last, Sir George Beilby, Director of Fuel Research, and Sir Frederic Nathan (who has been since December last devoting his whole time to his duties as Power Alcohol Investigation Officer) explained the contents of the memorandum, the information contained in which, it was emphasized, is of a preliminary character.

DIFFICULTIES IN THE WAY OF PROVIDING POWER ALCOHOL.

It will be remembered that in 1918, Mr. Walter Long appointed a Committee to consider the whole question of alcohol as a motor fuel, with the result that, after the issue by the Committee of a report that contained much useful matter, a small permanent organization was set-up under the Fuel Research Board of the Department of Scientific and Industrial Research; and Sir Frederic Nathan was appointed to continue the inquiries. One portion of the memorandum consists of a summary of the present position of power alcohol. For certain classes of motor vehicles, he points out, liquid fuel of properties similar to those of petrol is essential; and the liquid fuel that is most suitable in this respect is alcohol—probably mixed with ether or liquid hydrocarbons. The liquid hydrocarbon already in use is benzol; and successful trials of mixtures of alcohol and benzol have been carried out by the London General Omnibus Company. Benzol can also be used itself. During 1918, when the gas undertakings were working to recover as much benzol as possible, the total output was about 10 million gallons; and in the same period the coke-ovens produced about 32 million gallons. It is, he says, improbable that anything like the above quantity of benzol will be produced in gas-works in future. But, on the other hand, the output of the coke-ovens might increase in time. The total production from both sources in 1919 was about 20 million gallons, as compared with the petrol requirements, estimated this year at 250 million gallons. It does seem to him that the best way to use the alcohol which it is hoped will become available in increasing quantities would be to mix it with liquid hydrocarbons; and, if so, further experimental work in this direction should be undertaken without delay.

Calculations are set out in the memorandum, with the remark that generally it may be stated that the production of alcohol in any considerable quantities from vegetable materials grown in the United Kingdom is not economically possible. As to production in the Empire outside the United Kingdom, with the present increasing output of cane sugar there should be very considerable quantities of molasses available for the manufacture of power alcohol; and the possibility of utilizing these molasses is being brought to the notice of the authorities of the countries concerned. Even under the most favourable circumstances, however, the quantities of power alcohol available from this source must be comparatively small, and will in the first instance mainly be used in replacement of petrol in the neighbourhood of its production. The cultivation of plants containing starch or sugar within the Empire, for the special purpose of using them as raw materials for the manufacture of power alcohol, is not subject to the same extent to the difficulties existing in this country. All matters in connection with this aspect of the question of the Empire production of power alcohol are being investigated; but even in the event of it being possible to produce alcohol in the British Dominions and Colonies at a price at which it could be imported, distributed, and sold in this country, it must be a matter of time before supplies in any great quantity could be available. Some of the legislative questions which arise in connection with the use of alcohol for power purposes have been dealt with in the Finance Bill for this session; and one result of the Government action will be that the production and use of alcohol for power purposes will be much facilitated.

IMPORTANCE OF GAS AS A FUEL.

The third section of the memorandum discusses the question of alternative motor fuels, and is in the following terms:

It is clear from the foregoing review of the position as regards power alcohol as a substitute for motor spirit that, so long as the only raw materials for its production are food-stuffs, either imported or grown in the United Kingdom, the production of power alcohol on an adequate scale cannot be regarded as a possibility in this country till other and cheaper sources of power have been exhausted or proved to be inadequate. In a recent discussion at the Royal Society of Arts on a lecture by Sir John Cadman, on the "Oil Resources of the British Empire," the Director of Fuel Research called attention to the fact that coal is now, and is likely to remain, the world's principal source of fuel. While

the world's output of coal is of the order of 1500 million tons per annum, the output of petroleum is about 75 million tons. He emphasized the necessity for dealing with the fuel question from the point of view that, in this country, the natural source of heat and power is coal, and that unless, and until, it is proved that oil exists here in very large quantities, we have no alternative but to concentrate our best energies on the adaptation of the products of coal to the purposes of transport by sea and land. As the principal products of coal are gas and coke, these forms of fuel ought to be used to the fullest extent.

Even from the world point of view, coal must remain by far the most important source of heat and power; for, while there are no doubt great undeveloped sources of natural oil, these cannot for a moment be compared in extent with the undeveloped coal deposits which are known to exist or which can be estimated from geological surveys with a degree of certainty which does not apply to similar estimates of the possible occurrence of oil deposits. If this proposition is true as regards the world's supplies of fuel, its application to the British position cannot be too strongly emphasized; and it is obviously the duty of our engineers to think in terms of coal and its fuel possibilities.

Fortunately, the possibilities of coal as a source of heat and power are not limited to its use in the raw state as it comes up from the mines. By processes of carbonization and gasification, raw coal can be "sorted out" into gaseous, liquid, and solid fuels, and a large percentage of the potential thermal units which it contains can be obtained in forms which are more available for the production of heat and power than are the thermal units of the raw coal. In round numbers, a ton of average coal can produce by direct combustion 30 million B.Th.U., of which in the best steam-engine practice about 19 p.ct. can be obtained as power. By gas-producers and gas-engines a considerably higher percentage can be obtained as power,

The gas undertakings of the United Kingdom are at present obtaining from each ton of coal carbonized about 6 million B.Th.U. in the form of town gas, 1¾ million B.Th.U. in the form of liquid products, and 17 million B.Th.U. in the form of coke. By recent developments in gas-making practice, 8 to 9 million B.Th.U. have been obtained in the form of gas, 3½ million B.Th.U. in the form of liquid products, and 15 million B.Th.U. in the form of coke; and it is anticipated that, in special cases, as much as 10 to 12 million B.Th.U. may be obtained in the form of gas. The availability of the thermal units is much higher in the form of gas than in the original coal; and under present conditions 1 million B.Th.U. in the form of gas finds a ready market at a price of 8s. to 9s., as compared with 1s. 6d. in the form of raw coal. Gas tar, which is a mixture of all the liquid hydrocarbon products of the gas-works, has a fuel value of about 16,000 B.Th.U. per pound; and by fractionation it can be still further "sorted out" into benzol and other volatile liquids, fuel oil, and pitch. The availability of the thermal units of these products is in a descending scale; the more volatile hydrocarbons being of the highest value. The thermal units in the form of coke are of much the same value as in the form of raw coal.

At H.M. Fuel Research Station at East Greenwich, accurate data are being obtained as to the thermal and economic effect of the "sorting out" of fuels of different availability from the leading types of coal. For each type the method of treatment may have to be specially adapted; for there is no such thing as "average coal," and, even if there were, the data obtained from its carbonization would be of little or no value to the designers of processes and plant for the different types of coal which have to be handled.

The cost of 1 million B.Th.U. in the form of petrol at 3s. per gallon is about 21s., or two-and-a-half times that in gas, and fourteen times that in coke. The cost of 1 million B.Th.U. in the form of alcohol at 5s. per gallon would be about 52s.

From the thermo-dynamic point of view, the availability of thermal units in the form of gas is at least as high as that of the thermal units in the form of petrol; but when the necessity arises of carrying fuel for a long run, petrol is obviously the more convenient form, as it can be taken in containers of moderate dimensions and of light weight, while the carriage of gas involves the use of either very large or very heavy containers.

The position as regards coal as a source of motor fuel may be summarized as follows:

1.—Coal is the largest as well as the cheapest source of fuels for transport purposes.

2.—Means are already in our hands for the "sorting out" of the potential energy of coal into forms of different availability, and therefore of different commercial value.

3.—The more volatile forms, like benzol and light naphtha, are so relatively costly that they ought only to be used for air transport, or for the lighter and swifter forms of road vehicles. Their use for the heavier forms of transport is wasteful and unnecessary.

4.—Town gas and coke-oven gas are available in large quantities in most parts of the country, and might be extensively used in omnibuses and passenger cars for quick traffic, if light and yet safe containers could be constructed, and if stations were established on the principal routes, at which the containers could be quickly and easily replenished. If the carbonization of coal at temperatures about 600° C. becomes common, gas of twice the calorific value of town gas would be available for this purpose, so that twice the thermal units could be carried in the same containers.

5.—The coke produced by the carbonization of coal at 600° C. is a tarless, smokeless fuel, easily lighted, and easily kept alight, and would be admirably adapted for use in suction-gas producers and engines. The cost of the thermal units produced in this way would not exceed 3s. per million, or one-seventh of the cost of petrol units with petrol at 3s. per gallon.

Some Explanatory Remarks.

Sir George Beilby said that he used the term "sorted out" as being one which would explain in an easily understandable way exactly what he meant. It seems that at the Fuel Research Station the behaviour at 600° has been examined of quite a large number of different types of coal, and there has been collected a great deal of information as to gas products, liquid products, and types of coke. They have not yet definitely solved the question of how best to carry out this carbonization; but they do know the facts, in a way in which they do not think they can have been ascertained before, as to the economic and thermal balance-sheet of this method of, as it is termed in the memorandum, "sorting-out" at 600° C. As 8 to 10 p.ct. of the gas still remains in the coke, it is easily lighted. The gas evolved at 600° has twice the richness of ordinary gas, and is said to lend itself very well to considerable compression in containers. No very great progress has, it seems, been made with the production of ethylene from coke-oven or other gases, which is still in the experimental stage. The original estimates as to the production of ethylene have proved to be more than optimistic; and under the best conditions, even supposing the process became commercially successful, the quantity would represent a small proportion of what is needed to supplement petrol. At the present time at East Greenwich investigation is being carried on with regard to the subject of steaming retorts; and the publication in due course is promised of data relating to this work.

To sum up, said Sir George Beilby, from the report it is clear that the future development of power alcohol as a motor fuel will no longer be hampered by legislative enactments, so that its technical and economic possibilities can be put to the test by actual experience; and the development of every possible source of raw material can be considered on sound lines. It is evident, however, that the prospects of a speedy development of alcohol are not such that other sources of motor fuel should be neglected. The utilization of coal and its products for this purpose is of the first importance, and should be encouraged in every way. This cannot be too strongly urged on the designers of motor vehicles.

NITRATE POSITION AND PROSPECTS.

Though last year proved a lean one to producers of Chilean nitrate, high hopes are held out in regard to the present twelve months. Messrs. Thomson Aikman, Jun., in their half-yearly report on the subject, prophesy that this and the next year, with sales up to date by the Producers' Association averaging over 15s. per quintal, promise to be the most profitable in the history of the industry. In most cases the trading of producers last year was confined to the sale of stocks carried over after the armistice, at about 9s. 2½d. per quintal. The demand for fertilizers made progress during the past spring; but the serious financial condition of Europe at the height of the consuming season, prevented many people covering their requirements. In America, the demand has exceeded expectations, and shows an increase of nearly 50 p.ct. as compared with the last completed pre-war year. The cost of production was unfavourably affected in the early months of the year by the rise in the Chilean exchange; but the subsequent steady reaction has again caused a considerable reduction. The Chilean Government recently announced an alteration in the method of payment of duty; the change representing an important concession to producers, by materially reducing the amount actually payable in gold. This, it is thought, should result in the nominal amount of 2s. 4d. per quintal charged for export duty being stabilized at nearer this figure, whereas in the past it has occasionally amounted to as much as 3s. 6d. per quintal.

Prosperity is also the note on which Messrs. W. Montgomery & Co. open their report; for they say that with the advent of the new year came an era of prosperity which had already commenced to dawn upon the industry towards the close of 1919—perhaps, owing to a combination of circumstances connected with the war, one of the darkest years in the history of the trade. Last year, without any inducement on the part of buyers to anticipate future needs, the Producers' Association were left in a dilemma, having bound themselves to prices that were not then obtainable. So soon, however, as it was determined to meet the market, things were altered, and steady progress in the matter of prices became the order of the day, until during December 10s. 6d. and 10s. 8d. per quintal for ordinary and refined qualities respectively were freely given for 100,000 tons, which for the cheaper producers was a by no means unremunerative price. The first tender in the new year for a similar quantity, for May-June delivery, resulted in a sale at about 12s. 9½d. per quintal; while the next tender, for 500,000 tons, April-December delivery, realized an average of about 15s. per quintal. At a meeting held early in June in Valparaiso it was resolved to sell up to 1,100,000 tons at from 15s. 6d. to 17s. per quintal, at the rate of 100,000 tons per

month. At the time of the issue of the present report, nearly the whole of this quantity had been satisfactorily disposed of at an average price of about 16s. 8½d. per quintal; and it is understood that a fresh offer has been made at an advance of 3d. per quintal, September-April. Apparently the Association have sold in all about 3,050,000 tons, of which it may be reckoned that 1,100,000 tons were shipped and dealt with in the accounts for 1919, while the balance of about 1,950,000 tons should appear in the accounts for 1920 at around 15s. 3d. per quintal. In fact, the f.o.b. price in Chili has this year been advanced at least 5s. to 6s. per quintal, and since the first sale of the Association in autumn something like 7s. per quintal, or about £8 10s. per ton. Attention is drawn by the firm to the heavy drop that has occurred in freights; though they add that it would not be wise to rely on the freight market being beyond recovery, as much of the present fall may be attributed to a temporary lack of merchandise or crops at some particular ports. Reviewing all the factors in the situation —including prospective large demands by Germany and Austria, the growing demands of America, and the importance of every country growing all the foodstuffs possible—Messrs. Montgomery venture to think there is every likelihood that within the next year or two there will be much increase to record in the growth of the industry. Synthetic nitrogen in any form may be ruled-out as a serious competitive factor, probably for the next two or three years; and even then the world's need for nitrogen might well absorb it all.

NATIONAL PHYSICAL LABORATORY.

Report for 1919.

THE report of the Executive Committee of the National Physical Laboratory for last year opens with an expression of sincere regret at the retirement and subsequent death of their Chairman, Lord Rayleigh. Appreciative reference is also made to the services of Sir Richard Glazebrook, who retired upon reaching the age limit, after having held the position of Director for nearly twenty years. The new Director is Prof. J. E. Petavel, F.R.S., who has been closely connected during the past ten years with the work of the Laboratory. Mr. C. C. Paterson, who joined the staff in 1903. and was in charge of the Electrotechnics Division (including the photometry work) retired in December last. The past year has been marked by the further development of the method of working the Laboratory, under the financial control of the Treasury, as a branch of the Department of Scientific and Industrial Research. Among the new plant contemplated is a small gasholder, which is to be provided in order to maintain the steady gas supply required for the metallurgical furnaces and other purposes. Owing to the considerable gas consumption, the ordinary means of supply from the gas-works have been found inadequate.

In the outline of work proposed for the present year (which has been approved by the General Board) there is some mention of photometry; it being stated that provision is required for the photometry of the modern gas-filled electric lamp, which has largely displaced the arc lamp. The many questions relating to this offer a wide and important field for research. With the continued improvement in methods of illumination, says the report, and in connection with the preparation of standard specifications which is now being taken in hand by the British Engineering Standards Association, the installation of spherical integrating photometers has become a matter of special urgency. This subject has already been taken up; and it is hoped during the year progress may be made. Closely allied with this is the subject of illumination photometry. The need has been felt of an illumination photometer on somewhat different lines from the present commercial instruments; and experiments are proceeding.

It seems that it has been found impossible to obtain consistent readings of candle power on a gas-filled lamp when the latter is rotating; so that, unless some form of integrating photometer is employed, the measurement of candle power of a gas-filled lamp in any but a fixed position is a laborious process, necessitating a number of readings in various positions. In consequence of this, increasing use has been made of the whitened cube photometer set up in 1911. This form of integrator, while not theoretically as good as the spherical form, is nevertheless declared to be sufficiently good for ordinary purposes, provided a standard is used the distribution of the light from which approximates fairly closely to the distribution from the source to be measured.

There is, of course, in the report [which is published at the price of 5s. net by H.M. Stationery Office] a great deal of highly interesting information that does not call for notice here.

THE THERMAL EFFICIENCY OF THE GENERATION AND USE OF GAS AND ELECTRICITY.

Reply by Sir Dugald Clerk, K.B.E., D.Sc., F.R.S.

IT will be recalled that, at the close of the discussion which took place at the joint meeting last month [see "JOURNAL," June 22, p. 778] of the Institutions of Gas and Electrical Engineers, Sir Dugald Clerk, who opened the debate, said that he would later deal in writing with the remarks which had been made by the different speakers. We have now received from him the following reply.

I wish to thank the President, the Council, and the Members of the Institution of Electrical Engineers most heartily for their very kind reception of Prof. Smithells, Prof. Cobb, and me. They heard the case for gas efficiency in the fairest way, and expressed themselves in a very friendly manner—not only to us as brother scientific men engaged like them in the search for truth, but they have also sympathized with the desire for progress in the great gas industry. They were all of opinion that the great electrical industry could flourish in co-operation with the gas industry. They recognized that our country had need of the services of both, and looked forward to the great expansion of the gas industry in friendly rivalry with the expanding electrical industry. Undoubtedly, both industries will flourish under free competition, provided both are left free from hampering legal restrictions.

To me the attitude of the electrical engineers is most gratifying, and leads me to hope for better understanding between us, and more co-operation than has been the case in the past. The gas industry fully recognizes the imperative necessity for electricity as well as gas.

I thank, also, all the distinguished electrical engineers who took part in the discussion, and gave us the benefit of their criticism. With regard to this criticism, I had hoped that the question of the actual efficiency figures given in my lecture and in the Clerk-Smithells-Cobb report would have been fully examined into and discussed. No criticism, however, has been made of these efficiency values. Only a very few references were made in the discussion to any thermal efficiency question. Mr. Wordingham, for example, stated that, when a gas-engine was running light, it was running uneconomically, and wasting a large amount of heat. Mr. Merz also questioned the figures given as to efficiency of gas-engines running at various loads—varying from 20 to 25 p.ct.; and he stated that these efficiencies were not obtained or kept in practice except in very exceptional circumstances.

None of the other speakers questioned the efficiency values given by gas-engines.

With regard to Mr. Wordingham's statement, I would point out that, even as early as 1905, most ordinary horizontal gas-engines in towns were running with coal gas on a 27 p.ct. brake efficiency of gas with the engine at full load; and at one-third load the brake efficiency was still 20 p.ct.

Mr. Merz is quite mistaken in assuming that 20 and 25 p.ct. are exceptional efficiencies in the ordinary coal gas-engines of to-day. A brake efficiency of 30 p.ct. at full load is not at all uncommon. Almost any good modern horizontal gas-engine will give 30 p.ct. brake efficiency at full load, and will run with but little fall down to one-third load.

With regard to heating by electricity, no criticism is made of our figures. Mr. Wordingham, it is true, points out that the ease of turning a switch to produce electric heating or motive power is so great that economies can be made when heat is required for short periods, or motors have to run for similar short periods doing discontinuous work.

Gas engineers quite understand the advantage of electricity used in this way; but the main point of my lecture and the joint report has been to show the actual efficiencies in extended and continuous use.

I find myself quite in agreement with my colleagues, the electrical engineers, in considering that thermal efficiency is by no means the sole determining factor leading to the use of gas or electricity. Both gas and electricity have conveniences which far exceed those of solid fuel; and no doubt both would be used instead of solid fuel in many circumstances.

With regard to Mr. Wordingham's remark as to large gas-engines being at present under a cloud, I should like to call his attention to the inverted vertical gas-engines which have been rapidly introduced into use during the past eight years. One firm alone has supplied over 100,000 B.H.P. in these engines in units from 500 to 3000 H.P. These engines are largely used for generating electricity at collieries and in other places.

I quite recognize that, for the great central stations now in use, it is necessary to go to units very much larger than 3000 H.P.; and consequently the steam-turbine finds great use.

I agree with Mr. Merz as to the importance of reducing the cost of labour. All manufacturers ask, How can we produce our products most cheaply; and no doubt cheap motive power is very necessary. The very large and extending use of the smaller gas-engines running with town's gas shows how much manufacturers do appreciate such cheap motive power. For work of this kind the gas-engine industry shows an ever-increasing expansion, which has not been checked in any way by the use of the electric motor. It is true that many of the smaller gas-motors, up to perhaps 5 H.P., are but little used because of the greater conveni-

ence of small electric-motors. But the only effect the electric-motor has had on the gas-engine industry so far is to push-up the average power of individual gas-engines. At a certain power it becomes much more economical to use a gas-engine for a small works than an electric-motor; and accordingly gas-engines are so used in very large numbers. I have already pointed out many times that much more than a million horse power of gas-engines are at present in use in Great Britain—many of them operated by coal gas.

I do not quite agree with Mr. Merz and Mr. Sparks as to the limitation of the coal conservation report to motive power. It is true that the 55 or 56 million tons were to be saved out of the 80 millions by electric motive power alone. This mistake, however, I have criticized in the "Forrest Lecture;" and I need not deal further with it here. I would point out, however, that it was necessary for the gas industry to deal with not only motive power and light, but also with electric heating. Mr. Merz will no doubt remember that this campaign for the general use of electricity for light, power, and heat really began with Mr. S. Z. de Ferranti's presidential address to the Institution of Electrical Engineers in 1910. Mr. Ferranti made the following statement:

> "It appears that . . . the coal should be converted . . . into a form in which it is most generally applicable to all purposes without exception, and in which it is most easily applied to all our wants, and is at the same time in a form in which it is most difficult to waste or use improperly.
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> "We are, therefore, forced to the conclusion that the only complete and final solution of the question is to be obtained by the conversion of the whole of the coal which we use for heat and power into electricity, and the recovery of its bye-products at a comparatively small number of great electricity producing stations. All our wants in the way of light, power, heat, and chemical action would then be met by a supply of electricity distributed all over the country."

This statement Mr. Merz prefaced to a paper read by him to the British Association Newcastle meeting of 1916. His ambition was thus to supply all our wants in the way of light, power, heat, and chemical action. I have read the whole of Mr. Ferranti's address, and there is no doubt that this was his intention. Mr. Merz—unconsciously, no doubt—imparted that feeling to some extent into the Committee report; and this is evident from the statement of Lord Haldane in the prefatory note to the interim report of the Power Generation and Transmission Sub-Committee. Lord Haldane states:

> "The question of the conservation of coal, so far as it falls within the reference . . . is the question of economy in the use of coal through supplying electricity for power and other forms of energy."

There is no limiting here to power alone; and when I read Lord Haldane's address in the House of Lords dealing with the Electricity Bill I find that he very distinctly considers gas-works processes to be of a most uneconomical nature, and he does not hesitate to say so. These statements Lord Moulton attacked in the House of Lords. Apart altogether from the direct statement in the Committee's report, the whole effect of the propaganda to obtain large central stations was such as to imply that present processes were wasteful for supplying heat, light, and power, and that great economies would be obtained by generating electricity and distributing it to supply all these needs. To give one example. In an article by Mr. Sydney Brooks in the "Nineteenth Century and After" of March, 1919, we find this statement:

> "We are all sinners in this wastage of coal—householders, collieries, manufacturers, gas-works (they perhaps are the greatest criminals of all), railways, every person, every firm, every industry that uses it at all."

Such statements were made wholesale, not only in the monthlies but in many daily papers. Even Mr. Patchell in his remarks seems to have observed this feeling. He says: "Electricity was to be the cure-all. Rivers of electricity were to wash-away the effects of the war, if not the whole of the national debt." I can assure Mr. Merz, Mr. Sparks, and Mr. Patchell that in these circumstances it was very necessary for the gas industry to bestir itself, and show the high economies which were obtained in gas-making processes for the supply of heat, power, and light. Mr. Patchell thought I was "barking up the wrong tree" because the Coal Conservation Committee report excluded the 20 million tons of coal carbonized annually in gas-works. Surely Mr. Patchell is wrong. The report, by general inference, Lord Haldane's statements, foot-notes, and so on, clearly included the displacement of the present coal used in gas-works for generating gas.

In regard to Mr. Merz's statement that the figures obtained at some of the largest gas-driven stations in the world were inferior to those obtained at steam-turbine stations, I can only say that there are no really large gas-driven stations at work in Britain, although in one Government factory during the war there were 11,000 H.P. of vertical gas-engines under one roof generating current for an electro-chemical process. I have not been able to get from Government sources the efficiency figures of this generation; but I would refer Mr. Merz to a recent paper by Mr. W. H. Patchell, read within the last month or two at the Institution of Electrical Engineers. He will there find, as the result of a very careful test by Mr. Patchell himself, that the combined thermal efficiency of electrical generation was 19·9 p.ct. with a relatively small gas-producing plant and gas-engines of about 500 H.P. Such figures are very easily obtained in quite small stations. Gas-engine designers, however, are conscious of the necessity of increasing the power of gas-engines; and some are even attempting to use gas and oil on a large scale in gas-turbines. It may be that in the comparatively near future we may find gas-turbines with a 30 p.ct. efficiency. That, however, lies in the future. Mr. Patchell does not seem to have noticed that in both report and lecture we have dealt with 18½ as well as 8½ p.ct. thermal efficiency of electricity generation.

I am very much in agreement with Mr. Highfield as to the necessity for co-operation between the two industries; and I quite understand his argument that even cost is not the sole determining factor. In connection with the argument, however, it is interesting to notice Mr. Highfield's comparison, for boiling water, between electricity and gas. He states that 2·36 lbs. of water could be evaporated from and at the boiling point for 1d. with electricity, and also for 1d. gas could evaporate 12·9 lbs., whereas coal could evaporate 60 to 70 lbs. It is interesting to see that the ratio of cost between electricity and gas is, roughly, five times—that is, the electricity cost for evaporating water is five times that of gas. I quite appreciate that in some circumstances coal might have a similar advantage over gas at 4s. per 1000 c.ft.; but the gas industry is busily at work in remedying that. The gas industry, as I have recently pointed out, will get much higher efficiencies than are at present available.

I was glad to hear Colonel Crompton give such an encouraging account of his experiences with gas as a heating agent.

There are several other points which I should like to deal with; but I have not yet received the corrected contributions to the discussion by different members of the Institution of Electrical Engineers; and I shall reserve anything further I may have to say till I have seen the completed document.

An Incident in Changing-Over in Gas Supply.

At Morristown (Pa.), the Counties Gas and Electric Company changed-over from the manufacture of carburetted water gas to the purchase of coke-oven gas from a neighbouring concern; and after the change had been made calorific value readings were taken at various points between the coke-oven plant and the gas-works. It was noted that (in spite of the fact that there was approximately 7000 ft. of new main through which the gas travelled first) there was considerable increase in the heating value of gas between the coking plant and the inlet at the gas-works. This, says the Engineer (Mr. Henry B. Bryans), is accounted for by the fact that, in addition to the new main, the gas passed through approximately 1500 ft. of 12-in. cast-iron main which had been used in the distribution system previous to its employment for delivering the coke-oven gas to the works. As this main was immediately adjacent to the gas-works, there undoubtedly was a large amount of volatile vapours and oil which were picked-up by the coke-oven gas until they had been completely absorbed. Approximately 50 million c.ft. of gas, in a period of two-and-a-half months passed through this main before the calorific value readings obtained at the gas-works were practically the same as those at the coking-plant. The readings of heating value which were taken at various points in the plant revealed the same increase during the first few months.

Needs of Public Utility Undertakings.

Mr. Paul P. Haynes, a member of the Public Service Commission of Indiana, in a public address, declared recently that, if the public of Indiana are to be protected adequately by their public service corporations, the next two years must see a total expenditure of $88,000,000 for imperative improvements; and of this vast amount, the gas utilities of the State alone need immediately $8,000,000. The public interest demands that these improvements be made; but this cannot be done unless the corporations are able to obtain the money. They must be able to show financial houses that the businesses into which the money is going are in solvent, healthy, and profitable condition. The first step is for the utilities to teach the public that they are partners in this vast enterprise—partners who inevitably must suffer the losses and enjoy the prosperity of companies who dedicate themselves to the public service. Public confidence in utility corporations must be restored; and this can only be done by the establishment of proper public relations, which means open and above-board practices by the utility undertakings. But more than all this, confidence will come from the rendering of good service. Recent announcements of the Census Bureau disclose remarkable increases in the population of many cities. There is hardly a city anywhere that does not need substantial additions to its gas system and other utility properties. Thousands upon thousands of new homes have been built; and to these gas and water pipes, &c., must be laid. These things are not luxuries, but vital necessities, and in some instances necessities upon which the very life of the community may depend. It is the bounden duty of public service commissions to see that the utilities they regulate are not only solvent, but are healthy and profitable. It is not enough merely to let a utility corporation exist, but it should have a compensation which will reflect itself in prosperous operation, good financial credit, healthy growth, and good service. The best service should be liberally rewarded.

The members of the Midland Section of the Coke-Oven Managers' Association have been invited by the Sheffield Gas Company to visit their Grimesthorpe works on Saturday, the 31st inst.

SOCIETY OF CHEMICAL INDUSTRY.

Annual General Meeting.

THE Annual General Meeting of the Society of Chemical Industry was held last week in the Armstrong College, Newcastle-on-Tyne. Owing to serious illness, the President (Mr. John Gray) was unable to be present; and the position of Acting-President was taken by Prof. HENRY LOUIS, Mr. Gray's immediate predecessor in the presidential chair. The proceedings opened on Tuesday.

THIS was in effect a congress of the leaders in this country of chemistry as applied in industry and the arts. On two of the days there were two simultaneous sessions, of which one was specially under the auspices of the Chemical Engineering Group, which the Society formed a short time ago to meet the views of those of its members who believed that engineering as applied to chemical industry deserved special recognition and discussion. The sessions over which this group of the Society presided were devoted to the consideration of a number of papers relating to the principles of separation of solids from liquids in which they are held in suspension or retained in the colloidal condition. The methods of separation are generically classed in chemical industry as filtration processes, though they are commonly rather far removed from the older, though specialized, use of the term filtration in connection with public water supplies. The papers on filtration which were read and discussed at the meeting did not disclose any remarkable novelties. They were rather summaries of facts and methods already known to those specially concerned with them, but set side by side and viewed from various standpoints with the purpose of inviting critical discussion of their significance and applicability. The tar-works' chemist will be glad to think over these filtration papers; but gas engineers will probably consider them only of quite indirect interest to themselves.

The session at the Newcastle gathering which more particularly interested the large contingent of gas men who were present was that in which five papers relating to Bye-Product Coking were read. Perhaps the most interesting of these papers was the record of "something accomplished, something done" at Middlesbrough, given by Mr. Harold E. Wright, who stated that since October, 1914, practically the whole gas supply of the town had been coke-oven gas. The coke-oven gas supplied daily averaged 2,000,000 c.ft., and any further requirements were met by the addition of carburetted water gas made at the gas-works, where coal-gas manufacture had entirely ceased since 1915. Middlesbrough appears to present ideal conditions for the utilization of coke-oven gas for public gas supply—*i.e.*, an output approximately equal to public requirements, and sufficiently large for effects of variations in quality to be merged in a good average. The idea of academic fuel economists, who see in Middlesbrough an example to be universally followed, are, however, roughly disposed of by Mr. Wright, who points out that there must be a ready and continuous demand for metallurgical coke, for the manufacture of which many good gas coals are unsuitable. In his opinion, the coke-oven cannot be successfully operated to produce inferior coke—such as many coals would yield if coke-oven practice were extended to gas-works. He also removes much of the gilt from the gingerbread when he says that buyers of coke-oven gas will always be called upon to pay for it at least at its value in economic conditions of gaseous fuel supply, though he adds that in most towns coal gas is paid for at much higher prices than are involved in this stipulation. He touches on the economics of benzol recovery as applied to coke-oven gas intended for town gas supplies, but does not appear to regard it from the new aspect of the supply of heat units. Can the gas-works afford to outbid the motor-fuel supply-agencies for the thermal units contained in benzol, or are these agencies prepared to pay a higher price for the latter than corresponds to that paid by the gas consumer for thermal units, and also to bear the whole expenses of extraction from the gas? The motoring community affects to ignore the heavy cost of benzol recovery to gas undertakings when it prefers its claims, which would often entail its supply of specialized fuel being provided by a direct levy on the gas consumers' pockets.

The other papers on the coke-oven question included an interesting one in which Dr. E. W. Smith dealt with the Recovery of Bye-Products from Coke-Ovens. He was of opinion that the bee-hive oven would entirely disappear with the improvement of the physical characteristics of the coke from recovery ovens, and the recognition by coke users of the necessity of a revision of their ideas as to what physical characteristics were really essential for their operations. Mr. W. J. Rees tackled questions of the Corrosion of Coke-Oven Walls, in which chlorine in the coal and water is the predominant factor. Messrs. Hewson and Fowles had a contribution on the "More Economical Utilization of Coke-Oven and Blast-Furnace Gases for Heating and Power," in which they advocated the more extended use of the large gas-engine for generating current, and stated that the Halberg-Beth plant for cleaning blast-furnace gas was more efficient and economical than either the electro-static system or wet washers. Two engines upon examination after running for 15,000 hours each on clean blast-furnace gas were found to require no cleaning.

Mr. W. A. Ward gave an abstract, with many lantern illustrations, of a monumental paper on "Modern Bye-Product Coke-Oven Construction." Gas engineers who are engaged in the planning and erection of modern types of carbonizing plant will gain much useful guidance from Mr. Ward's experience in a collateral industry; and the publication of the full text of his paper will be awaited by them with much interest.

The Newcastle meeting, both technically and socially, was one of the most successful of the annual gatherings of the Society. The attendance was good, and the hospitality, both civic and private, extended to the members was most cordial. The one regrettable feature was the absence, through illness, of the President of the Society, Mr. John Gray, of Liverpool. The meeting was presided over with marked ability by Prof. Henry Louis, of Newcastle, who was Mr. Gray's predecessor in the presidential chair. Among the officers elected for the ensuing year may be mentioned Sir William J. Pope as President, Mr. E. V. Evans as Treasurer, and Prof. H. Louis as Foreign Secretary. Next year's general meeting will be at Montreal, on the invitation of the Canadian Section of the Society. Increased expenditure on paper and printing for the Society's "Journal" compelled the meeting to assent to an increase in the annual subscription of members from 30s. to 50s.

The Marley Hill Coke-Oven Works, the Ashington Colliery, the Newcastle Alloy Company's Works, Palmers and Swan, Hunter and Wigham Richardson's Shipbuilding Yards, and the Tharsis Copper and Sulphur Works were among the places visited by parties of those attending the meeting.

There was held in one of the laboratories of the Armstrong College—in the lecture theatres of which the conferences took place—a very interesting exhibition of chemical products, mostly of local manufacture. These included exhibits by the Newcastle and Gateshead Gas Company, who also distributed items of the propaganda literature of the British Commercial Gas Association. Several coke-oven firms and tar distillers had exhibits of tar products, briquettes, &c.; while refractories and glassware were also well represented.

COKING AND BYE-PRODUCTS SECTION.

Prof. P. P. BEDSON (Armstrong College), who presided over the first conference, said the papers they were to have read that afternoon referred to the coking and bye-product industry. It was impossible to over-exaggerate the importance of the complete utilization of coal—an importance which, during the past few years, had been brought home to the general public as well as to chemists and scientists by a method he had advocated years ago—a rise in the price of coal. He always felt a certain amount of regret when dealing with the subject of the recovery of bye-products. He gladly recognized the great progress the industry had made during the past few years; but, withal, it was a matter of regret that it had taken this country so long to appreciate and make headway in the practice of coking coal, especially with the recovery of bye-products, and particularly when they considered that forty to fifty years ago there were advocates who pointed out the benefits of the practice. That we should have allowed others—he would not specify who—to pioneer the industry was not a thing to be proud of, despite our present success. Notwithstanding our achievements, one was filled with regret when thinking of the time wasted. Of the factors which had contributed to the backward condition of the British bye-product coking industry, the first was that in this country, and particularly in the neighbouring county, such a good—superlatively good—supply of excellent coking coal was available that the practice of coking had not received much attention. Nature had provided such excellent raw material. The second factor had been the experience of ironmasters that a slightly larger amount of retort-oven coke was needed to make iron than of bee-hive coke; and this undoubted experimental fact, supported by the dictum of Sir Lothian Bell, had deterred many from embarking on the recovery of bye-products when coking coal. They had, however, made great progress in the industry during the last fifteen or twenty years. They had not only been able to equal the German methods, but had also, in the County of Durham at least, been able to improve in many ways on the processes. They could also apply their own raw materials to the construction of the ovens.

BYE-PRODUCTS FROM COKE-OVENS.

By Dr. E. W. SMITH.

The author traced the gradual elimination of the bee-hive oven by the adoption of the bye-product oven, and suggested that the bee-hive type would disappear completely so soon as the methods adopted in bye-product practice were such as to provide a coke having the necessary physical characteristics of bee-hive coke for the particular industrial requirements, and when some of the present users of bee-hive coke realized that not all the characteristics of bee-hive coke were essential to their particular operation. He was quite sure that a great deal of uncalled-for pre-

judice existed among furnacemen in favour of bee-hive coke, and that bye-product coke could be made that, when properly used, would give equal results with bee-hive coke. Dr. Smith was of opinion that the present methods of steam raising at coke-ovens with gas in Lancashire boilers was wasteful, and that the gas might be put to a more profitable use and the steam raised by cheaper means. On the question of gas as a bye-product, he was convinced that when large extensions of ovens were contemplated, and where there was an outlet for the gas produced to boost-up the town supply, the question of heating ovens by means of externally produced bye-product recovery producer gas should be fully considered, with a view to releasing for town use not just 40 p.ct. of the make of gas, but the whole of it. The author concluded a lengthy paper by a reference to the work of Mr. Ernest Bury and the extraction of alcohol, saying that the process showed great promise.

DISCUSSION.

Mr. H. E. WRIGHT said there was one point in the paper to which he would like to draw attention. Dr. Smith had spoken of 40 p.ct. surplus gas in the coke-ovens. In the newer regenerative types, it was more like 50 to 55 p.ct.

Mr. D. R. WATTLEWORTH asked what was the best process for the production of neutral sulphate.

Dr. G. LISHMAN said he thought the question regarding the use of bee-hive oven coke as compared with bye-product oven coke was really rather old now. Blast-furnace men had decided to use the smaller kind of coke produced in the latter, as it could be made in half the time.

Mr. A. E. F. KNOTT remarked that, regarding the temperatures for working, those given by Dr. Smith appeared more like the American way of working. There was no doubt that there were many good features in the method; but he did not think it could be adopted in England at that temperature without rebuilding with a class of silica bricks which would stand a heat greater than any they obtained in England. Then there were the abrasions of the rams to be considered. Further, they could not do it here, as in America they made special provision, he believed, at the top of the ovens, for high temperatures. Regarding neutral sulphate, it was very desirable that the question should be considered, although he did not think it would be developed until the price compared more favourably than now with the cost of production.

Mr. E. E. WOOD said that the question of using patent oven coke in blast-furnaces as compared with bee-hive coke had been carefully considered at the works at which he was engaged. They found that any coke which could stand in the ordinary cupola would stand in the blast-furnace, and it was more difficult to get a good cupola coke out of patent ovens than a good blast furnace coke. They obtained better coke the cooler the temperature.

Mr. S. A. WICKNER thought it ought to be emphasized that greater attention should be paid to keeping ammonium chloride out of tar. Once it got in, it was difficult to remove, and became an intolerable nuisance. There was great need for research in this direction. He had had some nasty fires from this cause, and he thought the matter was worth careful attention.

Mr. W. DIAMOND said that Dr. Smith's remarks that the greater part of the gas used for heating boilers could be better utilized was one that might have applied some years ago; but there were sufficient efficient burners on the market now which would burn it quite effectively in the boilers. They made calculations some time ago and found they were working at 9d. per 1000 c.ft. He agreed that crude methods existed, and that gas might be economized much more than at present.

Dr. SMITH, replying to the discussion, said he was glad to hear that 50 to 55 p.ct. was the amount of surplus gas from the ovens of the newer type. He was speaking of the average oven, not of any particular type of oven on which advances had recently been made. The question as to what was the best process for making neutral sulphate could be put to any qualified chemist, and he would answer it. It did not need to cost much for drying. It was possible to do it in a number of quite cheap ways; and any one of several ways was excellent. The method employed by the South Metropolitan Gas Company was one of the best and cheapest. Regarding the high temperatures of ovens, and the possibility of getting satisfactory bricks in this country, much of his experience was from the Saltley Gas-Works at Birmingham, where the ovens were kept at the high temperatures he named. There was not much fear of the cracking of the hydrocarbons passing through the heated chamber at the top of the ovens. At low temperatures benzol was not produced in such great quantities as at high temperatures. The amount produced compared very favourably with the best horizontal practice. This indicated that high temperatures were not a deterrent. They used English bricks—he believed they were Leeds silica bricks—and the life of the ovens was quite satisfactory. In short, he thought the high temperature bogey did not exist. He was glad Mr. Wickner had mentioned the ammonium chloride question. They used to have scraps about this, and, in private, he believed that he agreed with Mr. Wickner. Ammonium chloride was indeed a serious bugbear to tar distillers. Despite Mr. Diamond's figure of 9d. per 1000 c.ft., he thought that if 1s. 6d. could be obtained for town supply it was wasteful to use it for boilers. He was sure that a great number of the boilers he had seen were burning gas in an inefficient way. A single pipe into a Lancashire boiler was not an efficient way of burning the gas.

MODERN BYE-PRODUCT COKE-OVEN CONSTRUCTION.

By W. A. WARD.

This paper dealt with the design, arrangement, and construction of the coke-oven and its appurtenances. The author pointed out that the choice of site for a coking plant is a matter requiring very careful study; and the selection of the type of coke-oven to be used in connection with a bye-product plant will be decided by the manner in which the surplus heat available is to be made use of—no other consideration really need be taken into account. Generally speaking, there is no attempt on coking plants to make full use of the hot waste gases from the ovens, whether these be regenerative or non-regenerative. A novel form of producer gas fired oven, with continuous recuperation for both gas and air, has recently been introduced by Messrs. Simon Carves, Ltd.; and a small trial battery has been erected at the Cargo Fleet Iron-Works, near Middlesbrough. Mr. Ward was not able to give details; but he said that the principle has been carried much farther than ever before, and he believes the firm have great expectations of its future place in gas-works and steel-works.

After giving descriptions of the various types of ovens, the author went on to discuss general principles of design.

CORROSION OF COKE-OVEN WALLS.

By W. J. REES.

In the course of his paper the author said that the characteristics of the ordinary type of silica brick which rendered it unreliable for coke-oven use were its continued growth during use, its rather high porosity, and its tendency to spoil from the repeated changes in temperature. It was now possible, by combining the two factors of suitable grading and adequate burning, to produce a silica brick with physical properties such as should make its successful use in coke-oven practice a distinct possibility. Such bricks were already being made, and were being put into places where corrosion had been severe. American experience had shown that, at coking temperatures, the conductivity of good silica bricks was decidedly greater than that of fire-clay bricks or semi-silica bricks. This should be a further point in the use of silica bricks in coke-oven construction.

ECONOMICAL UTILIZATION OF COKE-OVEN AND BLAST-FURNACE GASES.

By G. W. HEWSON and S. H. FOWLES.

The authors set out to show that coke, after leaving the oven, produces large quantities of gas which can be more efficiently utilized than is the practice at present. The authors agreed that blast-furnace gas alone should be used for gas-engines in the power-house, and that the surplus coke-oven gas will be better employed in heating steel furnaces and soaking pits, either alone or diluted with blast-furnace gas. They added, however, that the purpose for which surplus coke-oven gas is actually used is largely dependent upon the location of the ovens. The demand for the gas may be sufficiently great in some instances to make the gas a more important product than the coke.

The authors went on to say that increase of knowledge of blast-furnace gas should give an impetus to the construction of internal combustion engines and turbines. The most recent guarantee figures for large water-tube boilers give about 218 c.ft. of blast-furnace gas of 100 B.Th.U. per c.ft. as the lowest requirements per kilowatt generated with turbo-generators, which gives a thermal efficiency of 15·5 p.ct. over boiler, turbine, and generator; while to-day, with gas-engines at 10,000 B.Th.U. per B.H.P. hour, it is possible to get an efficiency of 25·5 p.ct. The number of engine-room attendants required is the same in each case; but more attendants and cleaners are wanted for boilers and turbines. The maintenance and repair of gas-engines are sometimes found greatly in excess of that for turbines; but this does not apply to engines working on clean blast-furnace gas. Two engines have recently been examined, after running without any trouble for 15,000 hours each; and they required no cleaning. Other engines have run on this clean gas for equally long periods without requiring the gas-throttles cleaning. Again, the greater efficiency of the gas-engine more than compensates for the loss of sensible heat due to the necessity of cooling the gas for the engine, against retaining it for boiler use. Comparing the thermal efficiency of gas-engines with steam-turbines, the saving which can be effected by the former points to the importance of installing the most efficient machinery to utilize the gases evolved from the blast-furnaces of the country. In their opinion, the Halberg-Beth method is pre-eminently the most efficient plant for cleaning blast-furnace gas.

COKE-OVEN GAS FOR TOWN SUPPLY.

By HAROLD E. WRIGHT.

In his paper, the author dealt with the economic application of coke-oven gas to town supply. He said that, where surplus coke-oven gas is available at adjacent coke-oven plants under separate control, the quality of which can be readily ascertained, its use for supplementing or replacing existing gas supply is a mere matter of ascertainment and bargaining. Public authorities so placed can most probably secure a supply of gas at a lower price than that at which their existing plant can manufacture it. This, however, is only likely to be so in isolated instances. The general case will require coke-oven plant to be installed and existing gas manufacturing plant replaced. Of course, this cannot be applied to every case, because many points need very careful consideration before the change is made. Successful coke-oven under-

takings derive revenue from the sale of metallurgical coke; and only in areas where such fuel can be sold readily can they succeed. Continuous operation is necessary to the success of coke-ovens. The coke-oven cannot be successfully operated to produce inferior coke. The coal for coke-ovens must also be suited to the product required. The sale of metallurgical coke becomes more difficult as the ash in it exceeds 10 p.ct. and the sulphur 1 p.ct. On this account, many good gas coals are not as suitable for coke-oven use. With this limitation on the coal supply, the regenerative oven calls for twice the amount of coal to produce the same gas; and this in many cases will present great difficulty to-day. The substitution is probably only worth considering where much extension or renewal of manufacturing plant is contemplated, and then only when the regular supply required is fairly large. Thus it is much to be feared that all the chief influences will in general operate collectively against the introduction of the thermally more efficient coke-oven method of gas supply. There will be cases favourably placed; and the author indicated matters which should enter into their consideration.

Average coke-oven gas from which benzol and its homologues have not been removed only differs from coal gas resulting from the destructive distillation of coal in a plain retort in that it generally contains about 5 p.ct. by volume more nitrogen. If the benzol is extracted, the illuminating value is low; but when this is not done, average coke-oven gas can be taken as generally equal to the gas supplied in any town to-day, because the latter is a mixture of coal gas and water gas more or less carburetted. Further, it is possible to control and improve the quality of the portion of coke-oven gas taken for town supply, if proper arrangements are made. Without going into close details, in coking Durham coal it is found that illuminants rapidly diminish after the first half of the coking period. Methane diminishes, being replaced by hydrogen after two-thirds of the coking period. It is only in the final stages that nitrogen increases rapidly.

He concluded his paper by giving some particulars with regard to the supply of gas to the Middlesbrough Corporation from the coke-ovens of Messrs. Sir B. Samuelson & Co., Ltd. Since October, 1914, practically the whole gas supply of the town has been coke-oven gas. The author advocates that, in all places where it can be adopted, the regenerative coke-oven producing metallurgical coke is from a thermal point of view the most efficient means for gas manufacture, and that, compared with ordinary gas-works returns as published, if it can be adopted, it can supply cheaper and better gas to the town consumer at prices nearer the true thermal value.

DISCUSSION.

The CHAIRMAN said that the last two papers were very interesting, and should provoke a discussion among those present.

Mr. T. HARDIE said he was very much interested in the last paper as a manufacturer of gas; but he was bound to say he did not agree with all that Mr. Wright had said. There was no doubt that coke-oven gas was quite suitable for distribution for domestic purposes. When the author inclined to the view that in most circumstances the coke-oven was the best method of producing such gas, he differed with him. The local conditions were most important. In the first place, there must be a demand for the coke produced; otherwise there would be the carrying of the coke to wherever else it was required; whereas in manufacturing gas in the ordinary way the coke was saleable to a large extent in the district in which it was manufactured. It should not be forgotten, when reading the tables Mr. Wright had given, that gas manufacture fluctuated considerably. In the summer time the consumption of gas was, approximately, half that of winter time. If nothing but coke-ovens were adopted, it would mean that a large proportion of the plant would be laid-off for a considerable period of the year; and repair costs would naturally increase. The figures of his Company in pre-war days did not correspond with those in the paper. Their return from coke and breeze sales was nearer 55 than 45, and from other residuals, instead of 24, was nearer 28. The other figures he would not go into, as it was largely a question of plant. The ordinary plant for manufacturing gas to-day could be reduced to half of pre-war cost on a comparative basis. Regarding the efficiency of the new plants, it was possible to recover the waste heat not only from the settings, but from the coke itself. It seemed to him that if one recovered this waste heat, there was not much waste left. One could imagine that the efficiency of such a plant was as great as any coke-oven plant where a lot of heat was lost in the discharge of coke. It was a fact, of course, that there were savings in handling large quantities as against small; and this was where coke-ovens might save against gas manufacturers' methods. By modern mechanical handling, however, this saving was considerably reduced. The use of coke-oven gas at Middlesbrough had been very successful; but it had been found there that a certain amount of plant for the manufacture of gas had to be maintained to supply gas in the event of the coke-oven supply failing through strikes or anything else. This plant had been put into operation fairly recently. The consequence was that the cost of supplying gas went up; and when other places were supplying cheaper gas, the Middlesbrough price did not compare favourably. Even to-day, with the large contracts for gas at pre-war rates, there were other towns in the district supplying gas at a less figure.

Mr. J. E. WEYMAN alluding to the paper on blast-furnace gas, said there was no doubt that the Halberg-Beth system had been successful; but there was now a later American plant, which was much more effective. There was no cooling of the gases, and it was a more suitable process.

Mr. E. E. WOOD, referring to the Hewson-Fowles paper, said he would like to know where there was a firm making one ton of steel from 8000 c.ft. of coke-oven gas. His own figures were at least 20,000 or 30,000 c.ft. more than that. Of course, it was an ideal process; and he agreed it should be done. The question of using steam-turbines or gas-engines, when all was said and done, was one of £ s. d. The figures in the paper showed a gas-engine to be the more economic proposition; but the figures which he had got out proved just the contrary. They talked of fuel economy; but one could not drill it into shareholders that works should be run on lines of fuel economy. They ran for dividends. One had got to show better figures even than those given in the paper to get them to turn from steam to gas. The figures regarding cost of plant were too unreliable in the present kaleidoscopic state of affairs regarding costs. The whole point as to the efficiency of the steam-turbine as against the gas-engine was a debateable one.

Dr. G. STANLEY WEYMAN said he would like to refer to the quality of the coal used if coke-ovens were to be substituted for gas production. The coal for coke-ovens should be suited to the product, and the sulphur, ash, and phosphorus should be limited. It was not necessary to be so strictly limited in coal-gas manufacture in the ordinary way. As a matter of fact, the coal for gas-works did not need to have any coking properties. If they turned all the gas-works into coke-ovens, a certain amount of coal would not be used by the latter and, he presumed, would become a drug on the market. The two spheres were not at all identical.

Mr. A. E. F. KNOTT said he would like to point out, with regard to the remarks on the sale of coke in the district, that gas coke for export was that day being quoted at 21os. per ton, and even patent coke at 20os. [Laughter.]

Mr. HEWSON, replying to Mr. Wood, said that, with reference to the ton of steel made by 8000 c.ft. of coke-oven gas, this figure was taken from the "Iron and Steel Journal" in 1914, and confirmed by Sir Robert Hadfield. He would refer the question of steam-turbines and gas-engines to Mr. Fowles.

Mr. FOWLES said that one speaker had referred to the American plant, but this plant had yet to prove that it could make gas in this country. He would like to put the case in a general way, and say that, by the adoption of the Halberg-Beth system, they were saving about 1d. per unit on the system. They were buying at 1¼d. and now produced at less than ¼d. The blast-furnace managers said at first that they preferred the steam-turbine; but now they preferred the gas-engine, as it kept the burden of the furnace free. If one used the smaller coke, the reciprocating blow engine helped in this direction a great deal. One speaker had referred to fuel economy, and the reluctance of shareholders to go in for changes. They assured their shareholders that they had saved £200,000 in a year; and this sort of thing would convince any shareholder. It had been said that gas-engines were beaten by steam-turbines; but he submitted that they had proved they were not. The Newcastle Electric Supply Company, who for years had used waste gas under the boilers, now employed gas-engines, and were getting more than double the units. When they saw a firm like that, who had dealt with the raising of power and steam for about thirty years, adopting the gas-engine, it was good proof of what the gas-engine could do. The gas-engine had suffered in the past because it was not properly handled and looked after, nor was the gas properly cleaned. In using blast-furnace gas, they were free from tar troubles; the engines ran freely after 15,000 hours' work and required no cleaning. Though it was proposed to inspect them every three months, it was found that every eighteen months or two years would be sufficient. All round they found people making inquiries regarding the "H-B" process; and he knew they had contracts for seventeen plants, and the gas-engine makers could take no more orders for three years. Independent of the question of £ s. d., they had to think of the national welfare, and there was not an unlimited supply of coal. The coal question should be studied and studied a good deal more than at present. In addition to the other benefits of the system, they claimed £9000 a year from potash recovery, which was obtained without any difficulty. It was taken out of the hoppers perfectly dry, and put straight into bags to be sent to the railway.

Mr. WRIGHT said that, so far as Mr. Hardie's remarks were concerned, he (Mr. Wright) was at fault for not reading more of the paper, as he had dealt with most of the points raised. He agreed that coke-ovens could only be substituted in areas where the coke could be sold readily. While he agreed with much that Mr. Hardie had said, there were cases where large expenses would be incurred in extending gas plants; and gas engineers should consider the possiblities of coke-ovens more than they did. Mr. Hardie had spoken of the profits on coke and residuals being higher than the figure he had given. In the case of Newcastle, he could understand that costs would be lower there than if the gas-works were in the South or Midlands. With regard to the price of gas in Middlesbrough, the current rate was 2s. 4d. per 1000 c.ft.; and he knew of no gas plant selling at less than that. The auxiliary gas plant was erected because the coke-oven output was too small to deal with the increased demand.

The session concluded with a vote of thanks to the authors of the various papers.

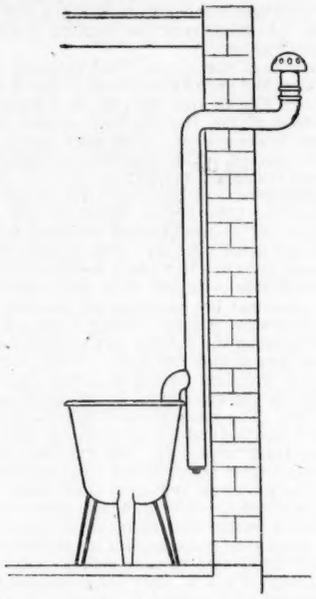
North Carolina Gas Association.—It was decided at a meeting of the representatives of nearly all the twenty-one gas plants in North Carolina to form an Association for the purpose of taking steps to meet the emergency in the gas industry which exists as a result of the largely increased prices of gas-making materials and the extreme difficulty in securing delivery. It seems that gas manufacturers whose contracts for coal and oil are now expiring are unable to place new contracts, and are being compelled to purchase in the open market at prices which are in many instances considerably in excess of twice those paid under the old contracts. With other manufacturers combining to secure such allocation and priority of shipment as will protect them from interruption of service, North Carolina gas men felt that the interests both of their customers and their shareholders called for similar action on their part. Among the objects of the North Carolina Gas Association is the preparation of a series of statements explaining, for the information of the gas consumers of the State, the troublous condition of affairs in the industry.

FLUES FOR GAS-FIRES AND COPPERS FOR HOUSING SCHEMES.

From the Ministry of Health's Official Organ, "Housing," No. 25.

The Ministry have had under consideration the question of methods of construction of flues for gas-fires, and have discussed the matter with the British Commercial Gas Association. The Ministry consider that the following rules should be observed:

1. The cavity of a hollow wall should not be used as a flue for gas-fires, unless a suitable shaft is properly constructed therein.
2. If smoothly finished, the size of the flue for a gas-fire need not exceed 20 in. in area, but should not be less than 18 in. in area, nor less than 3 in. wide in its narrowest part.
3. All flues for gas-fires should discharge into the outer air at the top of the building; so that there may be no danger of back-draught into any room.
4. Additional flues of about 20 in. area might, with advantage, be provided as ventilating flues adjoining fire-flues, with inlet openings near the ceiling.



With regard to gas-heated coppers, it is essential to provide flues for the removal of the products of combustion, especially of the steam from the heated water. The latter renders it very desirable for the flues to discharge as quickly as possible into the open air, and the above illustration shows a suitable method of providing this.

The flues suggested for the copper are 3 in. cast-iron or earthenware, completed at the outside with a suitable terminal.

Gas Standards for the United States.

The United States Bureau of Standards have issued a new edition of Circular No. 32, in which the matters dealt with are brought generally up to date. It is pointed out that the heating value standard adopted must be suited to prevailing conditions. The processes in use, and the quality of gas-making materials economically available, have both an important bearing upon the subject. As the factors vary from time to time, changes in the heating value requirements may also become economical and desirable. In view of all the facts, the Bureau believe that in most cases a value somewhere between 525 and 585 B.Th.U. will usualy prove the best average standard. With gas produced by special processes, or where coke-oven gas is washed for the extraction of light oil, average values lower than 525 B.Th.U. may prove economical. Further, in view of the serious shortage and high price of oil for water gas manufacture, it would appear that considerably lower standards for water gas may be necessary than have been fixed in the past. The Bureau recommend that maximum and minimum limits be placed 20 or 30 B.Th.U. above and below the average value fixed, and that the daily average calorific value be required to remain within these limits. It is very undesirable merely to supplement a candle-power standard by one fixing heating value. The heating value standard should supersede the candle-power requirements; and the latter should be dropped.

Temporary Increase of Charges Act.—Orders under the Statutory Undertakings (Temporary Increase of Charges) Act have been made by the Ministry of Health authorizing the Porthcawl Urban District Council to increase the maximum charge for gas by not more than 50 p.ct.; the Withnell Urban District Council, from 5s. 6d. to 7s. per 1000 c.ft.; and the Bourne Urban District Council, from 5s. 6d. to 7s. per 1000 c.ft.

SPECIFICATIONS FOR GAS-PIPING.

Standard Instructions for Drawing-up Specifications for the Gas-Piping of Houses not exceeding Six Rooms.

Housing authorities and their architects are advised by the British Commercial Gas Association to require that all houses and tenements of not more than six rooms shall be carcassed with gas-piping in the process of construction, to a specification based upon the following instructions. This will ensure a permanently sufficient supply of gas for all likely requirements, with the least subsequent disturbance of the walls, floors, ceilings, &c., and with the minimum of inconvenience to the occupiers.

SERVICE.

A 1 in. service should be laid to the meter position, leaving the service exposed as far as possible after it enters the house, and falling throughout its length from the meter to the main.

METER.

The meter position should be decided by arrangement between the gas undertaking's representative and the housing authority, subject to the following conditions being observed:

1. The meter should be as close as convenient or advisable to the point at which the service enters the building.
2. For the safety of the contents of the money-box in the case of a prepayment meter, the meter should not be too readily accessible from the front or back door of the house.
3. Prepayment meters should be fixed at a convenient and safe height for the insertion of coins.

A good position for the meter is in the cupboard frequently provided under the stairs.

METER SHELF.

It is worthy of note that the Women's Housing Sub-Committee appointed by the Ministry of Reconstruction, in their report state: "A gas-meter shelf is a frequent vermin harbourer. It should be made of concrete in preference to wood."

As an alternative to a concrete shelf, the meter should be fitted on spikes or iron brackets fixed to the wall, or, where it is not practicable for these to be used, on wooden shelves not less than ¾ in. thick.

For guidance as regards the space that is necessary for their accommodation, the overall measurements of 5-light, 10-light, and 20-light ordinary or prepayment meters are given below:

—	5-Light Capacity 30 c.ft. per Hour.			10-Light Capacity 60 c.ft. per Hour.			20-Light Capacity 120 c.ft. per Hour.		
	Height	Width.	Back to Front.	Height	Width.	Back to Front.	Height	Width.	Back to Front.
	In.	In.	In.	In.	In.	In.	In.	In.	In.
Ordinary—									
Wet . .	18	13	11	20	17	14	22	20	17
Dry. . .	17	12½	9	19	15½	11	23	19	13
Prepayment—									
Dry. . .	16½	15*	9½	19½	16½*	11	23	19	13

* Including cash box.

CARCASSING.

As housing plans differ so materially, it is impossible to set out any definite specification to cover all possible pipe runs; but the following instructions should be observed as a general practice:

The outlet from the meter should commence with 1 in. iron barrel, continuing in this size to the first branch, which should usually consist of a 1 in. by ¾ in. by ¾ in. T. From one ¾ in. outlet of the T an extension in ¾ in. iron barrel should be carried to supply the cooker, copper (or wash-boiler), and water-heater; and a ¾ in. by ½ in. T should be inserted and a ½ in. point left in a convenient position for each of these. The remaining ¾ in. outlet should then be extended to supply the heating and lighting points; the following rules being observed:

GAS-FIRES.

Supplies of ½-in. barrel should be taken to each fire-place, whether or not it is proposed in the first instance to fix a gas-fire there. They should be terminated with an elbow (otherwise known as a "knee") looking upwards and plugged.

LIGHTING POINTS.

The pipes rising or dropping to bracket positions should preferably be of ⅜-in. bore, although circumstances may sometimes warrant the use of ½-in. pipes. In any case, a T and plug, instead of an elbow, should be used in the bottom of the upright pipe. It serves the purpose of collecting, in the plugged end of the T, rust, dirt, &c., which would cause a bad supply were an elbow used.

POSITION OF LIGHTING POINTS.

Generally speaking, the position of the lighting points should be determined in relation to the purpose for which the rooms to be lighted are used. This will generally be found to work out approximately as table p. 139.

HEIGHT OF BRACKETS.

The general use of inverted burners makes it necessary for the bracket position to be somewhat higher than in the past. To

Room.	Particular Fitting.	Position.
Hall or lobby .	Bracket or pendant with 30 c.p. burner	Best available for distributed light.
Living room .	Pendant with 80 c.p. burner	Centre.
Parlour . . .	Pendant with 60 or 80 c.p. burner	Centre.
Scullery. . .	Pendant or bracket with 30 c.p. burner	Best available for distributed light.
Bedrooms . .	Pendant with 60 c.p. burner	About 2 ft. 6 in. from centre of window frame.
Box room . .	Bracket with 30 c.p. burner	Most suitable position having regard to run of carcass, especially if bathroom adjoins, when a T through wall will supply both lights.
Bathroom . .	Bracket with 30 c.p. burner	Most suitable position having regard to run of carcass, but avoiding the possibility of the bather having to come between the source of light and the window.

bring the mantles in the correct position, the elbow should be left from 6 ft. to 6 ft. 3 in. from the floor. Care should be taken that the elbow which is to take the bracket looks square into the room and that the wall is securely plugged.

PENDANT POINTS.

Drop-pieces of ⅜ in. barrel should be brought to 1½ in. below the under-surface of the joists to enable an easy connection to be made after the plaster is completed.

GENERAL NOTES ON CARCASSING WORK.

The following instructions should be observed in carrying out carcassing work:

1. *Floor Traps.*—Small screwed-down traps should be left in the flooring over the gas-fire points at the fireplaces, and over the pendant points for the rooms below; so that the subsequent work of connecting the equipment, or dealing with possible defects, may be carried out expeditiously without damaging the floor.

2. *Position for Gas-Fire Points.*—Gas-fire points should never be left 2 or 3 feet away from the hearth, or they will subsequently have to be extended; but they should not be taken so close as to make it possible for them to be buried beneath the hearth. A suitable position is about 3 in. on the outside of the trimmer (or whatever defines the hearth if "Economy Gas-Fire Flues" are constructed), and rather more from the skirting. When leaving points for gas-fires, facility for connection thereto at a future date must always be ensured.

3. *Provision for Possible Extensions.*—Wherever there is a probability of its being required, a point, or at least a T or connector (otherwise known as "long screw and nut") in the carcass should be left.

4. *Size of Pipe.*—A slightly larger pipe than at first seems necessary should always be run if there is any reason to think that it may be called upon later to supply additional points.

5. *Examination of Piping before Use.*—Care should be taken to see that all pipes and their fittings are sound, and (above all) that they have clear fullways before putting them in. [It costs a great deal more in the end to trace and take out a split length, bend, or other fitting, or one that has some obstruction in it, than it does to make sure that all are right before and while putting them in.]

6. *Painting Threads.* — The sockets (otherwise known as "couplers") should be taken off every length of barrel and reversed, after painting the threads on the barrel. [The lack of a rub of a paint brush over the threads of a piece of barrel, bend, or other fittings has often cost a lot of time, trouble, and money in tracing a leak.]

7. *Cutting Joists.*—If joists are to be cut, great care should be taken to do the work neatly, and to weaken them as little as possible. A ¾-in. pipe does not need a chase large enough for a 1-in. pipe.

8. *Pendant Points.*—Pendant points should never be finished with an elbow looking downwards—a T should always be used; and if the supply is not so situated as to be continued to another point, a short piece of barrel should be inserted in the unrequired end of the T, to extend across the next joist, as a support to the pendant that is to be suspended from it. The end of this short piece of barrel should then be capped or plugged.

9. *Risers.*—The rising pipe should always be run so that it is readily accessible, especially at the place where it first arrives under the floor, in position for taking branches from. [The need for this is obvious. For instance, there have been cases where the riser to supply an upper floor, or from which drops are to be provided for rooms below, has been run upwards to beneath the boards on this floor, arriving immediately under the position selected for a bath or water closet, or hot-water storage tank. This can always be avoided if the plans are carefully studied before runs are decided upon. It will be readily realized that any neglect in observing this rule may lead to difficulties and unnecessary expense if at any time the carcass has to be examined.]

10. *Bends.*—Bends should always be used where possible, in preference to elbows. Where elbows are inevitable, they should be rounded instead of square.

11. *Testing for Soundness.*—When supplies are completed, all points should be carefully plugged, and the carcass tested for soundness. As ordinary low-pressure gas is usually delivered at a pressure not exceeding 4 in. or 5 in. column of water—lower than this in many cases—it is advisable to test the carcass pipes under an air pressure above this figure, in order to find out any weak spot which, though not showing itself at first, might subsequently become apparent after being continuously subjected to quite a low pressure. [A very good method of testing carcass pipes is to subject them to 6 in. pressure registered by a column of water in a U-tube gauge. An ordinary U-shaped pressure gauge registering inches of water is fixed to one of the points. The pressure of air is then raised inside the pipes by means of a cycle pump until the gauge reads 6 in. The gauge is then carefully watched; and if there is no difference in the reading after 15 minutes, the pipes can be accepted as sound. If the pressure falls, it indicates a leak; and the rate of fall is an indication of its magnitude.]

12. *Further Testing.*—Though the carcass has been tested under air pressure, and found sound by the gauge, as soon as the meter has been connected and the installation completed, the pipes should be tested again under gas pressure. This should also be made an opportunity for regulating all the burners.

SYNTHESIS OF AMMONIA.

According to "Engineering" there was in the "Bulletin de la Société pour l'Encouragement de l'Industrie Nationale for February last, a long account by Marcel Guichard, Vavon, and others of their war-time researches on the synthetic preparation of ammonia from nitrogen and hydrogen, and especially on the metallic catalysts which they used in the Haber process. They particularly experimented with metals of the iron group which are not readily oxidized by water vapour in the presence of an excess of hydrogen—leaving the easily-oxidizable metals of the alkalis and alkaline earths as less suitable, because they would require a complete drying of the gas mixture. The experiments were made with tubular electric furnaces of steel at temperatures up to 750° C. In most cases a temperature near 600° (generally a little below 600°) was found most efficient. They tried some four hundred metals and metal-mixtures or alloys, and found in ferro-molybdenum one of the best. This alloy was prepared either by dissolving ammonium molybdate and iron nitrate together in water, evaporating the mixture, and reducing the salt by means of hydrogen, or by precipitating the acid mixture of the two salts and by reducing the dried precipitate at 1000° C. With this alloy they obtained the highest ammonia concentration—4 p.ct.; while iron and molybdenum alone gave only 1 and 1·5 p.ct. Of single metals, nickel and cobalt proved equally efficient—the ammonia concentration reaching 3 p.ct. Uranium alone also gave good yields, in the perfectly dry gases; but alloyed with nickel or tungsten it proved a poor catalyst. On the other hand the life of the catalysts was decidedly prolonged by mixing them with 50 p.ct. of magnesia. This applies particularly to nickel, cobalt, iron, tungsten, and molybdenum. Nickel and cobalt when mixed with 20 p.ct. of alumina also answered. The furnaces were worked at pressures of 100 and sometimes 150 atmospheres.

West's Establish an American Firm.

Under this heading "Gas Age" (N.Y.) says that the growing scarcity of oil, coupled with the tendency to instal coal-gas plants in the United States, lends added interest to the announcement that the West Gas Improvement Company of America have just opened offices at No. 150, Nassau Street, New York City, so as to contract for and construct installations of Glover-West vertical retorts. The announcement is accompanied by photographs of Mr. John West (the founder and President of West's Gas Improvement Company) and Mr. Fred. J. West (Managing Director), and referring to them, the writer remarks that Mr. John West, who is over eighty years old, needs no introduction to the American gas industry. His accomplishments in designing machinery for the charging and drawing of retorts to minimize the arduous labour of hand working, and his development of the Glover-West vertical retort, have made his name almost as familiar in that country as it is in Europe; but Mr. John West and his organization have been more or less remote from the American gas man's shoulder-to-shoulder affairs. This is a condition that Mr. John West, more than any other, desired to remedy; and now he has taken steps to correct it by establishing a separate American unit of his business. Some time ago, in a personal tour, he made a study of American and Canadian conditions, and became convinced of the promising future ahead of the gas industry of America. Mr. Fred. J. West also made a similar tour. Glover-West installations are now in operation throughout Great Britain, in Canada, Australia, New Zealand, Norway, Sweden, Denmark, Holland, China, Japan, Brazil, South Africa, Germany, Austria, and the United States—using a wide variety of coal. In the United States and Canada within recent years Glover-West vertical retorts have been installed at Portland (Me.), Fitchburg (Mass.), Pawtucket (R.I.), Springfield (Mass,), Montreal, and Ottawa. At the present time a third plant is being constructed at Montreal; and, as already announced in the "JOURNAL," work is being commenced on the erection of new plants for Vancouver and Victoria.

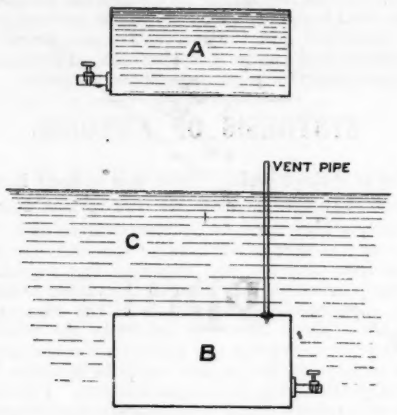
CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Dangers of Stray Earth Currents.

SIR,—In reference to the above-named article which appeared in No 2982 of the "JOURNAL," I may express the hope that it will not cause too much alarm to the managers of gas-works.

In the first place, current does not travel through the earth from place to place; current only flows between two points having a different potential to each other. So that to assume that current travels through the earth suggests, on an earthed telephone system, that messages from place to place (such as Bristol to London, and hundreds between) are all earth connections at different potentials.



I will try and give a simple explanation of what earth leakage is: In the accompanying diagram A is a tank of water, with valve connection; B is an empty tank with valve connection; and C is the ocean. The tank A is 20 ft. above the water; and the tank B is 20 ft. below the water. Now, if the valve of tank A is opened, the water will empty from the tank into the ocean, owing to its having a higher head or potential than the sea-level; and if the valve of tank B is opened, the sea water will rush in, owing to it being below sea level. Yet one would not see any difference in the ocean.

Now the earth is a huge electrically charged body, and its potential is not known, but is called zero; and all electrical pressures that flow to earth are supposed to be higher, and are called positive. Those that are lower, and flow to the electrical machine or cable are called negative. But in the case of high pressure and heavy amperage flow—such as tramway work—a certain amount of current will travel through damp ground for short distances, due to bad conductivity in the rails. This will cause three things: (1) A number of bad joints will put a big resistance in the return, &c., and require extra power to keep up the station pressure. (2) A tramcar with the power on is positive to earth until the rails make contact with it at the wheels. And if standing on a section with bad joints, and a person mounting the car should be standing on the track the bus-bar side of the bad joint, may get a severe shock. (3) Gas and water pipes close to the track get damaged through molecular action due to fluctuating field electrolytic action.

Such a case was mentioned by Mr. Widlake affecting condensers. The cable connection was broken from the telpher track, and the earth fault developed on the negative side, near the condensers. This would no doubt cause the trouble; but stray currents in close vicinity to telpher would not do much damage, like the action of ammonia and cyanide and sulphretted hydrogen, &c., would to pipes.

I would like to suggest that no earthed system is beneficial to gas-works for the following reason: When a fault developes in the + main, it causes what is known as a "burn-out" at that point, even if circuit-breakers are employed, as these, if not tested regularly, are apt to stick. I had a case some years ago when in charge of a tramway station. The trolley wire broke, and fell to earth; the breaker stuck, and it stopped dead a 500 H.P. triple expansion engine. The driver had the presence of mind to shut the valve and open the drains, thus saving the cylinders.

Now if a wire fell, or an "earth" occurred, in a purifier house or round any dangerous spot in a gas-works on an earthed system, the arc caused would be likely to cause an explosion, and also if the telpher is kept separate by motor generating. This means a loss of 20 to 25 p.ct. in power. So why not have the insulated system and double-armed trolley telpher with porcelain insulator bolts over the quenching tank? Then by the use of a megger, and a daily test with a voltmeter and lamps, insulation would be kept, and if a fault did ever come on through the wire falling or coming in contact with earth, no arcing would ensue.

In conclusion, I fully endorse Mr. Widlake's remarks regarding the necessity of having a skilled electrician in charge, having had eight years' experience of gas-works plant myself.

C. F. TUNE.

Bristol, July 14, 1920.

Neutral Sulphate of Ammonia.

SIR,—With reference to the letter on the above subject by Mr. W. M. Valon, of Stafford, in your issue of the 14th inst., it may be desirable to draw the attention of anybody manufacturing, or contemplating the manufacture of, neutral sulphate of ammonia, to patent No. 141,787, which has been acquired by my Company (Hydronyl Syndicate, Ltd.), an abstract of which was given on p. 437 of the "JOURNAL" for May 25 last.

GEO. S. PITT, Secretary.

140, *Leadenhall Street, E.C., July* 16, 1920.

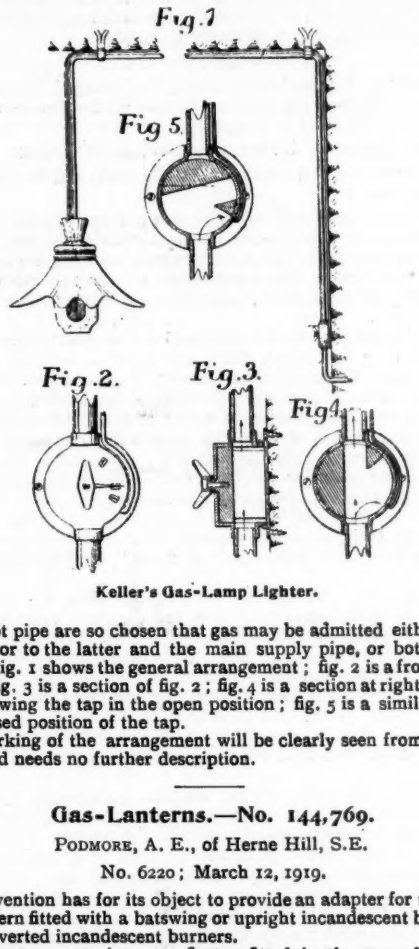
REGISTER OF PATENTS.

Lighting Gas-Lamps.—No. 144,059.

KELLER, H., of Herisau, Switzerland.

No. 11,812; May 10, 1919.

This invention relates to appliances for (say) lighting the lamps of a room, by acting on a controlling device placed in convenient proximity to the door. The gas-tap is provided with a rotary plug movable in a cylindrical casing and having a transverse cavity adapted to control the admission of gas to the main-supply pipe and to a pilot jet. The casing is mounted upon a base-plate fixed to the wall, so that the axes of the casing and of the plug are at right angles to the base-plate and wall. A handle, mounted axially on the casing, is adapted to turn the plug; and the shape of the plug-cavity and the position of the mouth



Keller's Gas-Lamp Lighter.

of the pilot pipe are so chosen that gas may be admitted either to the pilot pipe or to the latter and the main supply pipe, or both may be closed. Fig. 1 shows the general arrangement; fig. 2 is a front view of the tap; fig. 3 is a section of fig. 2; fig. 4 is a section at right angles to fig. 3, showing the tap in the open position; fig. 5 is a similar section in the closed position of the tap.

The working of the arrangement will be clearly seen from the illustration and needs no further description.

Gas-Lanterns.—No. 144,769.

PODMORE, A. E., of Herne Hill, S.E.

No. 6220; March 12, 1919.

This invention has for its object to provide an adapter for transforming a lantern fitted with a batswing or upright incandescent burner into one for inverted incandescent burners.

The adapter comprises a reflector fitted in the top of the lamp casing and provided with a central aperture through which the burner tubes pass and over which a chimney is mounted for conveying away the products of combustion.

This reflector is made a little smaller than the top frame of the lantern, and is fitted with readily fixable catches or devices which can be moved into position for projecting over the top-frame and supporting securely the adapter. Thus the plate, with its chimney, is capable of being inserted into an existing lantern through one of the side doors and, being raised to the level of the top frame, can be quickly secured in position without any difficulty. The catches are preferably movable in slots in the plate, and are furnished with screws and thumb nuts, so that they may be readily clamped by the finger and thumb of one hand. There may also be provided in connection with the adapter, a chimney fitted over a central hole in the reflector plate and formed with an aperture for the insertion of the tube of an inverted burner which depends through a central hole in the plate. The chimney may be secured to the plate in a readily removable manner—as by pin and bayonet slot connections.

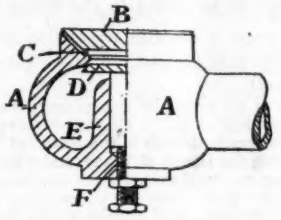
Burners for Gas-Cookers.—No. 144,772.

HELPS, G., of Nuneaton.

No. 6264; March 13, 1919.

According to this invention, the bunsen burner employed comprises a body, a loose head nearly closing the outlet from the body, and an

adjustable valve plan immediately below the head for regulating the primary air and contr lling the outlet.



Helps's Gas-Cooker Burner.

The illustration shows, in sectional elevation, a burner consisting of a body part A and a coned head B provided with depending pins C, which rest on the burner body and form, together with a coned extension of the body, orifices through which the gas and air mixture passes. D is a valve whose stem engages in a socket E, and F is a screw-threaded stud for adjusting the valve. If the loose head B is made adjustable, it is carried by a central screw-threaded stem fast with a disc provided with apertures for the passage of the gas and air admixture.

Making Gas.—No. 144,868.

CAMPBELL, D. E., of California.

No. 13,606; May 29, 1919.

This invention refers more specifically to a process for converting liquid hydrocarbon into gas; the salient object of the invention being "to produce from a low cost hydrocarbon oil a permanent gas by means of an inexpensive and extremely practical process and simple apparatus."

According to the patentee, a liquid hydrocarbon—such, for example, as that known as commercial distillate—is converted into a permanent gas by subjecting it in the form of an attenuated stream or jet to violent concussion by impact with a hard surface, preferably in the presence of atmospheric air at slightly increased pressure and without the application of extraneous heat.

It has been common for many years, says the inventor, to facilitate the carburetting of air by mechanical means operating to vaporize the oil and effect the mixture of hydrocarbon and air, so as to induce a more perfect carburation of the air. In such apparatus it is known to employ pumps to deliver the fuel to a spraying nozzle for mixture with the air supply—such nozzles directing the liquid with more or less force against baffles or cones of perforated metal. It has also been proposed to subject confined charges of oil to sudden impact by reciprocating pump plungers—the impact being stated to be sufficient to heat and vaporize the liquid, which was thus forced as a vapour into a mixing chamber. The present invention, however, is entirely distinct from such mechanical carburetting, as is best evidenced by the fact that it produces a true gas—*i.e.*, one which will not stratify or condense when kept indefinitely under ordinary gas storage conditions; and this by converting into gas practically 100 p.ct. of any liquid hydrocarbon which is too heavy to be usable in a practical way with any ordinary carburettor.

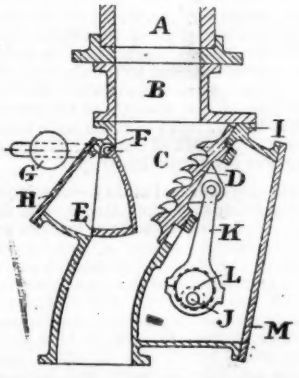
Coke Extracting Apparatus applied to Inclined and Vertical Retorts.—No. 144,952.

MITCHELL, J., of Nelson, Lancs.

No. 27,213; Nov. 5, 1919.

This invention is described as applied to a vertical retort; but it may (with modifications) be applied to inclined retorts where the material falls by gravity.

In carrying out the invention, reciprocating claw-plates having motion in different planes are fixed to the discharge mouth of the retort—one of the reciprocating movements being preferably in a plane making an acute angle with the axis of the retort, and (when used) another movement being preferably at right angles to the axis of the



Mitchell's Coke-Extracting Apparatus.

retort. A counterbalanced and swinging door fixed on a horizontal shaft is placed in juxtaposition—that is, on the opposite wall of the discharge mouth or duct to the claw-plate—and so arranged that when no material is in the hopper the face of the plate and the acting face of the door approximate to each other at the lower ends and form more or less a wedge-shaped floor to the retort, so as to prevent a "run" of the material. The reciprocating movement of the claw-plate moves the claws from and to the line of descent of the material, and carries the packed material past the swinging door, which is at this time pressed back into a cavity provided for it in the side of the discharge duct. An adjustable counterweight is provided on the shaft which carries the door, and by this means the pressure of the door towards the claw-plate on the descending material can be adjusted according to the nature of the coke being withdrawn so as to prevent any undue crushing of it.

This drawing shows a section of the device as applied to the discharge mouth of a vertical retort. A represents the retort; B is a connecting box or discharge piece; C is the hopper; while D shows one claw-plate sliding on the inclined surface of the hopper body I. The plate D, reciprocated by (say) a rotating shaft J carried in bearings L has an eccentric and connecting rod K, one end of which is connected to the claw-plate. Opposite to it, on the other side of the hopper, is a swinging door E, depending from, and fixed to, a horizontal shaft F. A crank arm or lever carrying a counterweight G is fixed on the shaft and causes the door to approach the claw-plate at their lower ends with any degree of pressure requisite to break off the descending coke by pressing it towards the claw-plate and so prevent a run of the material. The door is accommodated in a recess formed in the hopper casting C. H and M are inspection doors.

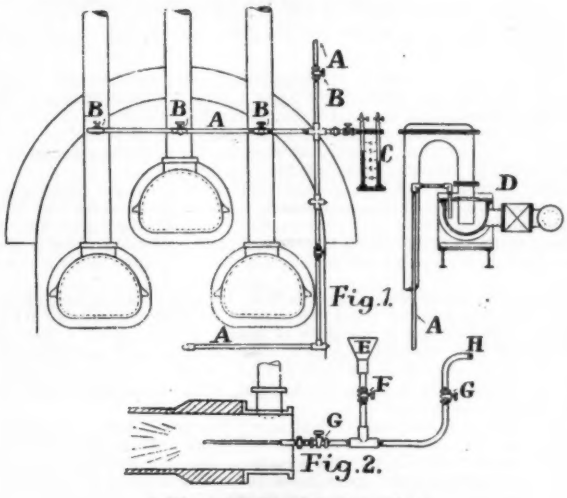
When applied to inclined retorts. the lever carrying the weight G is so adjusted on the shaft F as to urge the door E towards the plate D.

Enrichment of Producer Gas Generated in Retorts. No. 144,989.

GRIFFIN, C. of Shefford, Bedfordshire.

No. 10,496; April 15, 1920.

The inventor claims a method of enriching producer gas taken from the setting by mixing it (under control) in the ascension pipe or hydraulic main with gas from the retorts and with oil-gas obtained by injecting tar into one or more of the retorts.



Griffin's Enricher of Producer Gas.

The producer gas is taken by the pipe A (fig. 1) to the ascension pipes at B or to the hydraulic main D; while gas can be let in at all points marked B, and is entirely under control. C is an ordinary pressure guage.

In the case of a retort being worked as the producer gas is drawn from the retort up the ascension pipe, it is mixed with the enriched gas generated by tar apparatus shown in fig. 2.

The enriching apparatus can be connected-up to one or all retorts. The process being as follows: Tar is run into the pipe by the funnel E; and the cock F is then closed, and cocks G opened—the tar being injected into the retort by steam connected up to pipe H. A rich gas is then generated which, passing up the ascension pipes, enriches the producer gas to any desired extent.

Audley Extension Scheme.—Application has been made by the Audley Council for sanction to a loan of £15,000 for alterations and improvements at the gas-works. The Gas Engineer was authorized to provide the Ministry with full particulars.

An Opposed Increase at Ludlow.—At a meeting of the Ludlow Town Council on Monday of last week, the question of the proposed increase in the price of gas was discussed. The Mayor said notice had been given that the price was to be increased from 6s. 6d. to 7s. 6d. per 1000 c.ft. The Town Clerk said he had looked into the matter of the power of the Council; and the cost of opposition could not be paid out of the rates. Mr. Payton mentioned that the Electcic Light Company had to apply for permission to increase their price. The Mayor replied that the difference was that the Electric Light Company worked under a Provisional Order, but the Gas Company did not. Inquiry had been made of other towns of the same size as Ludlow, and the replies showed that in the majority of cases the councils had contracts with the gas companies. The Mayor eventually moved that a deputation wait on the Directors of the Gas Company to see if they could not obtain a reduction. If they could not get redress, they should try some other means. This was carried.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Ministry of Health Provisional Order (Gas) Bill was reported without amendment, and re-committed to a Committee of the Whole House.

With regard to the Gas and Water Provisional Orders Bill, the Chairman of Committees informed the House that the opposition to the Mablethorpe and Sutton Gas Order had been withdrawn. The Order respecting the commitment of the Bill to a Select Committee was discharged.

The Redcar Urban District Council Gas Bill was reported from the Select Committee, without amendment.

The Examiners certified that the further Standing Orders applicable to the Brighton and Hove Gas Bill and the Southend-on-Sea Gas Bill have been complied with.

The Ministry of Health Provisional Order (Gas) Bill was read the third time, and passed.

HOUSE OF COMMONS.

Progress of Bills.

Petitions against the South Suburban Gas Bill have been withdrawn by the Chislehurst and Foots Cray Urban District Councils and the Bromley and Dartford Rural District Councils.

Public Utility Companies (Capital Issues) Act.

A copy was presented of reports upon an application to the Board of Trade under the Public Utility Companies (Capital Issues) Act by the Walton-on-Thames and Weybridge Gas Company and Llandrindod Wells Gas Company.

Public Utility Companies and the Corporation Profits Tax.

In the course of the debate on the Finance Bill, dealing with the Corporation Profits Tax,

Mr. G. BALFOUR moved in sub-section (2, *a*), after the word "company," to insert the words "(not being a public utility company)." He said he gathered that the Chancellor of the Exchequer was to make a proposal to exclude public utility companies for a period of three years. If this was so, he had nothing more to say on the amendment, and would be very glad to accept his proposal.

Sir J. BUTCHER said he had an amendment on the paper which was, he thought, designed to meet the same point as that aimed at by Mr. Balfour. It sought to insert the words "but not including an undertaking when the rates, tolls, fares, dues, prices, or other charges are regulated either by Act of Parliament or Order having the force of an Act."

Mr. BALFOUR mentioned that later on the paper he had an amendment to define a public utility company in the following words: "'A public utility company' means a company authorized by a Special Act or an Order confirmed by, or having the effect of, a Statute, with power to raise capital by the issue of stock, or the borrowing of money for the purpose of carrying on any gas, water, hydraulic power, or electricity undertaking."

Mr. CHAMBERLAIN said he was sorry the amendment had been moved, because on report he must bring his own clause forward. In regard to the undertakings with which he intended to deal, his proposal was to suspend the operation of the tax in respect of them for three years, so that Parliament might settle how it was to deal with them, and could then review the question of taxing them in the light of the decision taken. Mr. Balfour's definition was not wide enough to cover the undertakings to which he should apply his amendment. If, therefore, Mr. Balfour would leave not merely the terms of the concession, but the definition of the undertakings, to be brought up by him on report, he would have an opportunity of discussing the matter then.

Mr. BALFOUR said he had no intention of submitting his amendment now. He wanted only to make a statement of his view.

The amendment was withdrawn.

REDCAR GAS BILL.

The Bill promoted by the Urban District Council of Redcar came before a Committee of the House of Lords on Tuesday of last week, and was ordered to be reported for third reading.

The circumstances attaching to the Bill were peculiar. The principal object of the measure, which has already passed through the House of Commons, is to authorize the Redcar Urban District Council to acquire the undertaking of the Saltburn and Marske Gas Company at the agreed price of £115,000. The Urban District Council agrees with the proposal; but some of the local ratepayers banded themselves together and petitioned against the Bill on two points. It is provided in the Bill that consumers in Saltburn and Marske are to be charged 1d. more per 1000 c.ft. than the consumers in Redcar; and the ratepayer opponents asked in their petition that this differential charge should not be permitted. It was also asked that the Redcar Council should be compelled to put all profits from the gas undertaking to the reduction of price. The strength of the opposition was such that no evidence was called; whereas the Chairman of the Redcar Urban District Council and Mr. Arthur Valon, gas engineer, supported the scheme of the Bill on behalf of the local authority.

The opposition failed; and the Bill was ordered to be reported for third reading.

GAS REGULATION BILL.

Amendments to be Moved in the House of Lords.

The Committee stage of the Gas Regulation Bill in the House of Lords was originally fixed for last Thursday, but was deferred until to-morrow (Thursday).

Only one notice of an unofficial amendment was given—by Lord Shandon; but a number of minor alterations were suggested by the Marquis of Londonderry on behalf of the Board of Trade. The chief of these was to permit the Board of Trade, under clause 10 (by Special Order) to "authorize any local authority to supply gas outside the area of the authority;" also to purchase any undertaking by agreement, and to "make such supplemental and consequential provisions as appear necessary to give full effect to the Order." Sub-section 4 of clause 10 it is proposed to alter so as to read: Before any Special Order under this Act is made, it shall be laid in draft before both Houses of Parliament; and such Order shall not be made unless both Houses, by resolution, approve the draft either without modification or addition, or with such modifications or additions to which both Houses agree. But upon such approval being given, the Board of Trade may make the Order in the form in which it has been approved; and the Order, on being so made, shall be of full force and effect. A new sub-section [5] is to proposed as follows: For the purposes of any Act of Parliament, whether passed before or after this Act, which refers directly or indirectly to a Special Act conferring powers on gas undertakers, a Special Order under this Act shall be deemed to be a Special Act.

The noble lord also proposed two new clauses to follow clause 10—one dealing with the stamping of meters, and the other with the qualification for appointment of inspectors of meters. These are as follows:

METERS TO BE STAMPED.

All meters by means of which gas is supplied by any undertakers to any consumer shall be stamped in accordance with regulations made by the Board of Trade under their powers in that behalf; and if any undertakers supply gas by means of any meter which is not so stamped, they shall be liable on summary conviction to a fine not exceeding ten pounds.

QUALIFICATION FOR APPOINTMENT AS INSPECTOR OF METERS.

(1) The Board of Trade shall provide for the holding of examinations for the purpose of ascertaining whether applicants for the post of inspector of meters under section 4 of the Sale of Gas Act, 1859, possess sufficient practical knowledge for the proper performance of the duties of that post, and for the grant of certificates to persons who satisfactorily pass such examination.

(2) A person shall not, after the passing of this Act, be appointed to act as an inspector of meters as aforesaid unless he has obtained such certificate as aforesaid.

(3) If any person, not being an inspector duly appointed under the Sale of Gas Act, 1859, acts as such inspector, he shall be liable to a fine not exceeding ten pounds, or in the case of a second or subsequent offence, twenty pounds.

(4) There shall be charged in respect of the examinations under this section such fees as the Board of Trade, with the concurrence of the Treasury, from time to time fix; and all such fees shall be dealt with in such manner as the Treasury from time to time direct.

WALLINGFORD URBAN DISTRICT COUNCIL ORDER.

The Ministry of Health Gas Provisional Order Confirmation Bill, which authorizes the Wallingford Urban District Council to utilize additional lands for gas purposes and to increase the maximum price from 5s. to 6s. per 1000 c.ft., was on Tuesday of last week sent forward for third reading.

Gas Workers' Short Strikes in Italy.—Last Thursday, according to a Reuter's message, in consequence of the Gas and Electricity Companies of Rome having refused to give a provisional increase of wages to their workmen, as they have done in the case of the clerks, the employees struck work for two hours in the evening. The electric current was cut off from 10 p.m. till 11 p.m. The current was also stopped in Florence for similar reasons.

Position of the Portmadoc Gas-Works.—When the Urban District Council decided to raise the price of Portmadoc gas from 6s. 5d. to 8s. 3d. per 1000 c.ft., Mr. Robert Hughes said he could not understand why the gas-works were a dead-loss to the Council, when the charges were higher than those in surrounding towns. Mr. Llewellyn Hughes remarked that the Council had no right to run the works at a loss to the ratepayers. Mr. W. M. Jones said the price fixed upon was quite reasonable, considering the price of coal and labour, and the fact that the gas undertaking was practically bankrupt.

The Chesterfield Gas-Works Fatality.—An inquest was held at Chesterfield into the death of Joshua Moore, who died [as stated in last week's "JOURNAL"] from the effects of injuries sustained while at the gas-works. When assisting to push a loaded wagon, deceased got on the wrong side of it, and was trapped against a stack of coal. Mr. Menzies (Factory Inspector) said at one point the space between the wagon and the stack was only 6 in. The Manager (Mr. H. Davies) admitted that a certain place in the yard was dangerous, and undertook to have 100 tons of coal removed, so as to leave a wider space between the wagons and the coal. He explained that at the time a number of men were pushing the wagon, and deceased was the only one on the wrong side of it. Warnings were frequently given to the men. It was difficult, however, to keep a regular gang of labourers; and some of the men might not hear the instructions as to the positions they had to take up when pushing the wagons. The Jury returned a verdict of "Accidental death," and accepted the undertaking to remove the portion of the coal.

LEGAL INTELLIGENCE.

WATFORD GAS-WORKS RATING APPEAL.

The Watford Gas and Coke Company recently entered an objection against the assessments in the parishes of Watford Urban, Watford Rural, Oxhey, and Bushey, which stood at a total of £3044 net rateable value. At the hearing of the objections, the Company were represented by Mr. Edward J. Slinn (the Chairman), Mr. J. Duncan Royal (the Secretary and General Manager), and Mr. E. Howard Collins (the expert retained to advise the Company).

Mr. Collins explained that the Company had been exceedingly reluctant to come before the Assessment Committee; but while they fully understood the difficulty of the Committee and of the local authorities, yet the position subsisting to day with reference to gas undertakings was such that the Company had no alternative but to ask the Committee for some relief, both in the interests of the shareholders and more especially in those of the gas consumers. The figures were produced and the position of the Company was fully explained to the Committee.

After a lengthy hearing, and on the advice of the Committee's expert, who was also the valuer to the County Rate Basis Committee, the Committee decided to fix the assessment on the Company's property in the four parishes at a net rateable value of £1500—a reduction in the assessment of slightly over 50 p.ct. This will mean to the Company a substantial saving annually in respect to local rates.

An Extremely Small Trespass.

An action was brought in the Farnham County Court (before his Honour Judge Lailey), by Mrs. Greenwood, against the Aldershot Gas, Water, and District Lighting Company, in respect to a boundary wall built by the Company adjacent to their works. The claim was for damages for trespass, for wrongfully entering plaintiff's land and crossing her field, wrongfully erecting certain buttresses upon her property, and digging and removing her turf, and also a claim for an injunction restraining a repetition of these acts, and a mandatory injunction to remove the encroachments and make good the damage. Mr. C. E. Moresby (for the plaintiff) said that on March 13, 1919, by deed, plaintiff and her mortgagee conveyed two pieces of land to the Company for £205. The agreement allowed the Company to erect a wall not more than 12 ft. high along the boundary-line dividing the vendor's other land from any other land belonging to the Company. In the beginning of 1919 part of the wall was blown down, and the acts of trespass of which plaintiff complained began in the early part of this year, when the defendants sent men on to plaintiff's side of the wall, without any notice, and without asking or receiving permission. These men set to work and dug holes on plaintiff's side of the wall, into which they put concrete slabs; and upon these slabs they erected buttresses, which extended into plaintiff's land 6 to 8 in. beyond the old buttresses. After hearing evidence, his Honour said that there was extremely small trespass, and the actual injury which plaintiff sustained was small; and he had come to the conclusion that the sum of £10 10s. paid into Court was sufficient to satisfy her claim for damages. With regard to the relief claimed by way of injunction, he did not think there was any high-handed entry on the plaintiff's land without permission; and the wrong committed was of extremely slight importance. It was not a case where an injunction ought to be granted; and he refused this form of relief. He gave judgment for defendants for the costs of the action, less the costs incurred by the plaintiff up to the time of the payment into Court.

Dublin Steam-Rollers and Gas-Mains.

In the Chancery Division of the Irish High Court, Dublin, Mr. Dockrell (instructed by Messrs. D. & T. Fitzgerald, Solicitors) applied on behalf of the Alliance and Dublin Consumers' Gas Company, plaintiffs in an action against the Dublin Corporation, for an order consolidating the action with another action which was pending. It was explained that the plaintiffs brought an action claiming an injunction to restrain the Corporation from using heavy steam-rollers over streets in which the Gas Company had laid their gas-mains, so breaking and damaging the pipes; and damages were claimed for the injury already caused. Since that action was instituted further damage had been caused, and therefore a second writ had to be issued. Mr. P. O'C. White, instructed by Mr. Ignatius Rice, consented to the order on behalf of the Corporation; and Mr. Justice Powell accordingly directed the consolidation of the actions.

Stirling Gas Light Company.—The Company are paying dividends of 8s. 7d. per share of the original capital, and 10s. per share on the new ordinary shares. To enable this to be done, the available balance of £4111 was augmented by a sum from the reserve fund.

Another Price Reduction at Blyth.—The Directors of the Blyth Gas Company have decided to reduce the price of gas to all consumers, from the meter-readings which were taken in June, by a further 8d. per 1000 c.ft., making the basis price 2s. 4d., which was the pre-war rate. They have been enabled to do this solely by the enhanced value of the residual products.

Electricity Deficit at Weymouth.—The Weymouth Corporation Electricity Committee have submitted a report which shows an estimated loss up to March, 1921, of about £10,000. To meet this serious deficiency, it has been decided to raise the charges to consumers for both lighting and power by 1d. per unit. This means for lighting 9d. per unit, which is the maximum price now sanctioned. There was a long discussion in the Council, after which the report was adopted, and it was decided that the Electricity and Finance Committees together should be asked to bring in a majority report upon the whole undertaking.

MISCELLANEOUS NEWS.

BRITISH COMMERCIAL GAS ASSOCIATION.

Executive Committee Meeting.

At the meeting of the General Committee of the Association last Wednesday, the following report was submitted for the consideration of the Executive Committee.

FINANCE.

A report was received from the Finance Committee; and the recommendations contained in it were commended to the consideration of the General Committee.

The estimates show that expenditure for the current financial year will absorb the balance of the "After-War Campaign Fund," and the accumulated balance on income and expenditure account. This has been rendered unavoidable by the necessary expenditure on publicity and services rendered in connection with the urgent question of housing, coupled with the great increase in administrative expenditure.

The result is that, as the Association has no floating capital, and the amount of money locked-up in stocks of printed matter, and in giving credit to purchasers thereof, is much greater than formerly, on account of the higher prices, they are unable to discharge their liabilities as promptly as they should.

It is recommended (1) that undertakings which usually pay their subscriptions between September and December should be asked to pay them at the earliest possible date, so as to provide an adequate cash balance—such subscriptions being, of course, credited to the ensuing, not the current financial year; (2) that undertakings usually paying their subscriptions in the June half year should be asked to pay them at the earliest possible date after the 1st of January; (3) that special efforts be made by members in each district to persuade (*a*) non-subscribing undertakings to contribute to the cost of work from which all benefit, and (*b*) partial subscribers to increase their subscriptions to the full basis; (4) that the Society of British Gas Industries be asked to pay their contributions early (instead of late) in the financial year.

It is evident that, unless the Association's usefulness to the industry is to be diminished seriously, the basis of subscription must be reconsidered at an early date.

DISTRICT CONFERENCES.

A series of conferences have been held in the various districts as follows:

District.	Town.	Date.
Northern	Darlington . .	April 30
Manchester (Lancashire section)	Manchester. .	May 13
Midland	Leamington .	May 14
Scotland	Glasgow . .	May 21
South-Western	Bath	June 15
Manchester (Yorkshire section) .	Leeds . . .	June 17
Eastern	Norwich . .	July 7

The meetings generally have been successful, especially by reason of the attendance of members of the public interested in housing and health problems; and the excellent press reports secured have been valuable for local propaganda work. The questions of housing and smoke abatement have formed the principal subjects of discussion.

INTERIM REPORT OF THE COMMITTEE ON SMOKE AND NOXIOUS VAPOURS ABATEMENT.

The interim report of this Committee, which was set up by the Ministry of Health to inquire into the question of smoke abatement—particularly in the domestic sphere—is a very valuable pronouncement in favour of the adoption and use of gaseous fuel. Copies of the report have been circulated to all members, with the suggestion that each undertaking should take steps to distribute the report locally to all interested in housing and health questions. The Executive is now pleased to report that this suggestion is being very generally adopted, as, given widespread distribution to the right people, much good must result to the gas industry.

HOUSING.

The Association is in constant and close touch with the Ministry of Health in regard to housing. The volume of inquiries both from inside and outside the industry is steadily maintained, and much practical help and advice are being given. The questionnaire asking for details of gas arrangements in schemes already adopted has been issued, and from the replies already received much interesting and valuable information is available. This is being used judiciously and confidentially for the assistance of members requiring help, and the service is much appreciated.

Mr. H. H. Creasey was invited by the Society of Architects to take part in an important discussion on housing by the members of the Society at the Building Exhibition at Olympia, and was afforded an opportunity of placing before them a full statement regarding the practical advantages of gas economy flues. His address was received with interest, and was favourably commented upon by many of the leading architects of the day who were among the large audience present at the discussion.

IMPORTANT RESULTS OF "B.C.G.A." PROPAGANDA.

The following correspondence bears testimony to the results constantly achieved by national and local propaganda work. It is an extract from a letter from Mr. J. W. Auchterlonie to the Secretary: "Every official who is responsible for the management of a gas undertaking must realize the enormous benefit which has accrued to the gas industry through the work of the 'B.C.G.A.' It is not only through the advertisements in the public press that the industry benefits, but through well informed articles appearing in magazines, educational, professional, and trade journals, &c. Not the least valuable part of the work of the 'B.C.G.A.' has been the research work undertaken by prominent scientists; and by reason of our co-operative organiza-

tion, we are enabled to publish and circulate among our consumers most valuable and useful information. Only recently I had an interesting example of the value of such propaganda work. I had circulated Prof. Cobb's article on 'Coal Conservation,' as published in the 'Edinburgh Review,' and Sir Dugald's Clerk lecture at the Royal Society of Arts, among all the prominent scientists and college authorities in Cambridge. That the seed had not fallen in barren ground was proved by the Bursar of one of the colleges coming to our showrooms, saying that he had read Prof. Cobb's article, and that he was convinced that heating by gas was the solution of the coal conservation problem. He had put his convictions into practice, for that particular college has paid the Company £1002 for laying on gas supplies to 250 fire-places, in addition to boiling-rings in the gyp rooms. Another college has inquired if, in the event of their doing likewise, we could guarantee an adequate supply of gas in the depth of winter. Further we have fitted 104 gas-fires in sixteen other colleges; and I believe the question of gas heating is having the consideration of some of the governing bodies of the colleges."

A THOUSAND AND ONE USES FOR GAS.

The thanks of the Executive are due to the several members who have generously responded to the Editor's request for particulars and photographs of interesting installations of gas appliances suitable for publication in "A Thousand and One Uses for Gas." It is hoped that this will lead to a further increase in the sale and distribution of this valuable periodical.

(Signed) F. W. GOODENOUGH, Chairman.

LEEDS GAS COMMITTEE'S REPORT.

The Leeds Corporation Gas Committee have submitted to the City Council their report upon the working of the department during the year ended March 31.

The gross revenue for the twelve months amounted to £888,404, and the expenditure to £739,265, leaving a gross profit of £149,139, out of which the Committee had to meet the following requirements: War allowances, £300; income-tax, £12,623; loan charges, £101,569; contributions to capital, £15,567—leaving a profit on the year's working of £19,080. The deficit of £39,908 at March 31, 1919, is thus reduced to £20,828. The quantity of coal carbonized (including the coal equivalent of oil used, &c.) during the year was 254,964 tons, as compared with 278,260 tons for the previous year, a decrease of 23,296 tons; the average cost per ton being 30s. 5½d., against 25s. 2½d., an increase of 21 p.ct. over the year ended March, 1919, and 162 p.ct. over the pre-war figure. The gas made in the year was 2,931,168,000 c.ft., as compared with 3,049,397,000 c.ft. during the previous year, a decrease of 118,229,000 c.ft., or 3·8 p.ct. This last figure includes 93,618,000 c.ft. of coke-oven gas received from the Middleton Estate and Colliery Company, which was an increase of 10,361,000 c.ft. over the previous year. The quantity of gas made per ton of coal used was 11,496 c.ft., the highest make per ton on record. It compares with 10,959 c.ft. for the preceding year. This, says the report, is all the more satisfactory, having regard to the fact that during the year the coal received was generally inferior in quality. In addition, owing to the high price of oil, only a limited quantity was used for the enrichment of blue water gas. As also more coke-oven gas was received, the coal gas had to be produced of a higher calorific value, in order to bring the average quality up to the standard. The unaccounted-for gas was only 5·8 p.ct., as compared with 6·1 p.ct. the previous year. In addition there was a saving of gas used on works of 6,304,000 c.ft., or together 14,461,000 c.ft., equal in money to £3121. Owing to the closing-down of the various munition factories, the consumption for industrial purposes was reduced by 181 million c.ft., while the consumption for lighting, heating, &c., increased by 87 million c.ft. The average calorific power of the gas, as shown by the hourly readings of the calorimeter, was 470 B.Th.U., as against the 450 B.Th.U. allowed by the Board of Trade. Leeds gas consumers have thus been supplied with gas 4·4 p.ct. better than the quality prescribed. The income from coke was the highest on record, amounting to £202,400; and after deducting the cost of handling and cartage, &c., the net sum realized was £166,921, being an increase over the previous year of £26,245. The total quantity made for sale was 116,848 tons, as compared with 131,722 tons during the preceding year. The increase was due to the advance in price and improvements in the plant effecting economy in working expenses.

The number of ordinary meters in use on March 31 was 65,090, as compared with 64,801 for the preceding year. The number of prepayment meters was 53,830, as compared with 53,813. The total number of meters in use was 118,920. There has, say the Committee, been a very steady demand for furnaces for industrial work; the number sold being 49, as compared with 31 the previous year. With experience of gaseous fuel gained by engineering firms during the war, it is confidently anticipated that the use of these appliances will be extended. The utility of providing a furnace demonstration room is more apparent every year. Many demonstrations have been given with consumers' own material, and orders placed as a result of the successful method of heat treatment in gas-fired furnaces; and during the latter part of the year a very large furnace was installed with a consumption of 6000 c.ft. per hour. This is working very satisfactorily. In addition, the department have undertaken the hardening of special apparatus by scientific methods—including motor gears, tools, and machine parts, the revenue from which materially assists in the cost of running the industrial show-room.

The position with regard to coal, with the exception of the period of the Yorkshire miners' strike, has not been so acute; and fairly regular deliveries were obtained. In regard to oil used for carburetting water gas, advantage was taken to fill the storage tank at the price of 8½d. per gallon, as compared with 1s. 4d. the previous year, and 3d. per gallon the pre-war price. The price of oil has again been advanced to 1s. 4d. per gallon; and by taking advantage of the market, there has been a saving of 7½d. per gallon on the quantity of oil in store, or £5500. During the year the wages of all classes of employees were increased; the total amount paid being £241,269, compared with £110,856 for the year ended March 31, 1915, an increase of £130,413, or 117 p.ct.

The Committee have given very careful consideration to the reorganization of the works, which, owing to the circumstances connected with the war, was postponed on account of the difficulty of obtaining borrowing powers. With the object of acquiring information as to the most up-to-date and efficient plants, the Committee visited Oldham, Longwood, Nottingham, Leicester, Birmingham, Newcastle, and Dundee, and, after careful consideration, recommended the Council to adopt a system of continuous vertical retorts.

There are comparative tables setting-out the working results obtained by Mr. C. S. Shapley, the Engineer and General Manager.

THE HANDICAP TO PROSPERITY.

Cause of the Great Increase in Gas Charges.

At a South Metropolitan Gas Company's Co-Partnership Committee meeting, the Chairman, referring to the further increase in the cost of labour and coal, said that this was bound to have effect on the price of gas. In the July issue of the "Co-Partnership Journal," Dr. Charles Carpenter enlarges upon this statement as follows:

The above statement is very different in character from that which it was for so long customary to issue in the July number of the "Journal." Yet it is undoubtedly of far wider importance to the employees than were the bonus announcements of brighter days; for the time has come when the price of gas has reached so high a figure as to act as an obstacle to its extended use. Can this be wondered at when we reflect that it is now nearly two-and-a-half times dearer than in 1914? We thought when the war was over that, after lying fallow so long, the field of its usefulness could be widely cultivated and extended. But high prices have seriously checked our hopes of progress in this direction.

What is the cause of the great increase? Those who believe nothing good can be done by a gas company—and such people are to be found in unexpected places—may cry "Profiteering!" And one can well believe that the ignorant agitators at street corners may go further still, and proclaim that the "Bosses" are getting it. But who are the "Bosses;" and what do they get? The remuneration of the Board of Directors for the twelve months just completed totalled £5900, as compared with £5667 for the year 1914. This cost works out at one-tenth of a penny for each 1000 c.ft. of gas sold in both periods. It cannot be the Directors who are profiteering. But the expression "Bosses" may mean shareholders as well as Directors.

Let us see what the shareholders are taking. In the year ended Midsummer, 1914, the shareholders were paid in dividends £351,500, or, as nearly as possible, 6¼d. for every 1000 c.ft. of gas sold. For the last twelvemonth, they will be paid £198,296 or almost exactly 3½d. per 1000 c.ft. of gas sold. The cost of living has gone up to these people, who invested their savings in good faith with the Company, as much as to other classes; and yet they are left with little more than half their pre-war income from dividends to meet it. It cannot, therefore, be the "Bosses" who are profiteering.

Then we come to salaries of officials. These represent only a fraction over 1½d. per 1000 c.ft. of gas sold more than in the 1914 period; the yearly totals being £183,949 against £92,317. As one of the results of the war, the duties the staff of officials are now called upon to perform are more varied and extended than ever before. It has to rely more and more upon its own efforts, and less and less upon outsiders, most of whom are too busily engaged to concern themselves much about gas companies' requirements. And, besides, the whole cost is but 3¾d. per 1000 c.ft. of gas sold. So we must still look elsewhere for the explanation of high costs.

We come therefore to the real factors which loom so largely in our accounts. For the year ending June, 1914, we paid in wages £612,118, a figure which has risen to £1,718,892 for the corresponding period just completed—that is, the year ended June, 1920. Expressed in cost per 1000 c.ft. of gas sold, it has risen from slightly over 10¾d. per 1000 c.ft. to 2s. 6½d. It would be wearying to deal with the whole of the figures (they are fully published from time to time in the half-yearly accounts); but the coal cost must be left out. The amount was £902,360 for 1914; and this figure compares with £2,169,029 to-day—that is to say, the cost of coal per 1000 c.ft. of gas sold has risen from 1s. 4d. to over 3s. 2d. per 1000 c.ft. There are, of course, other charges to be included and allowed for, as, for instance, materials and stores on the one hand and residual products on the other. But the fact remains that, even allowing for these corrections, at the present price of gas income does not balance expenditure; and I earnestly commend this fact to the serious consideration of all our co-partners who have at heart the future of gas supplies.

I have set out below, in tabular form, the figures referred to:

Statement showing Comparison of Certain Charges.

	Year ending June, 1914.		Year ending June, 1920.	
		Per 1000 c.ft. Gas Sold.		Per 1000 c.ft. Gas Sold.
	£	s. d.	£	s. d.
Directors' remuneration	5,667	0·10	5,900	0·10
Dividend on ordinary stock.	351,500	6·24	198,296 †	3·49
Salaries	92,317	1·64	183,949	3·23
Wages	612,118	10 87	1,718,892	2 6·22
Coal into works . . .	902,360	1 4·02	2,169,029 (est.)	3 2·14

† Equal to a return of £2 11s. per annum for each £100 paid for the stock.

The enormous increase in wages is, of course, mainly due to advances made to meet the abnormally high cost of living. Co-partners will readily see that in the present difficult circumstances the loyal co-

operation of every employee is more than ever necessary. Economy in both time and materials is of paramount importance—any slackness in either connection will inevitably delay a return of the more prosperous times desired, which can only be secured by the determined and continued efforts of all concerned.

The Gas Regulation Bill, introduced into Parliament by the Government, and our own Special Bill, cannot be regarded otherwise than as measures of justice; but they will be powerless to maintain the industry of gas supply in the position of favour it has so long occupied as providing one of the necessities of life unless gas is distributed at a price the public is willing and able to pay.

In conclusion, I must say a word about the recent strike threat. I had not—and have not—any fear as regards this Company. I have every reason to believe that the great bulk of the employees are satisfied with the co-partnership conditions under which they carry on their labours. Any, therefore, who "terminate their employment" under the circumstances referred to must understand that that termination will be complete, and that the only policy possible in the interest of the gas-consuming public they serve, in common with the whole of the officials from the directorate downwards, must be to replace them by others willing to accept obligations in respect of their services in return for the means of livelihood the consumers provide. And I have no doubt whatever that this attitude would have their support.

UNPRECEDENTED RESULTS AT CARLISLE.

When reviewing in the Carlisle City Council, on Tuesday of last week, the accounts of the gas undertaking for the past financial year, Mr. J. P. Buck (the Chairman of the Gas Committee) said they were unique, and the results unprecedented since the works were taken over by the Corporation in 1850. He stated that he would be prepared to recommend the Committee to continue the rebate of 9d. per 1000 c.ft. (and add the industrial section to it), which will practically reduce the price of gas to 3s. 9d. The Council agreed that the £28,932 profit should be appropriated towards the cost of the construction of the new gas-works—tenders in connection with which to the amount of £24,155 have been accepted. Referring to a recommendation of the Committee (which was adopted) increasing the salary of Mr. J. E. Blundell, the Gas Engineer, from £750 to £1000, he explained that this included any remuneration Mr. Blundell might be entitled to by acting as Resident Engineer during the construction of the new works. It was not unusual, in an undertaking of the magnitude of Carlisle, to appoint a specially qualified engineer to superintend the erection from beginning to end; but the Committee had sufficient confidence in Mr. Blundell to leave this work to him, feeling satisfied that they could not be in better hands.

In his report, Mr. Blundell pointed out that there had been an increase in the make of gas of 35,948,000 c.ft., or 9·2 p.ct. The total quantity sold was 387,220,500 c.ft., or an increase over the previous year of 9·3 p.ct. There was a gross profit of £32,253, and a net profit of £21,181. This, after adding a credit balance of £7792 brought forward, made a net credit balance at the end of the year of £28,973. During the year 1918-19, the average price of gas was 3s. 9·65d. per 1000 c.ft.; while for last year it was 4s. 5·64d. The unaccounted-for gas was 7·46 p.ct. For 1918-19 the make of gas per ton of coal carbonized was 11,410 c.ft., and for the past year 11,748 c.ft. The net cost per 1000 c.ft. of gas sold was in 1918-19 3s. 1·66d.; and in 1919-20, 3s. 3·73d.

UNSUCCESSFUL WAGES CLAIM IN THE ENGINEERING TRADES.

Awards have been made by the Industrial Court on claims by workers in the engineering and foundry trades of the shipbuilding and ship-repairing trades for an advance of 6d. per hour on existing rates. The claims were supported principally upon the grounds that the cost of living had increased since the date of the last general advance, and that the condition of the trades would justify a further increase in wages. On behalf of the employers, it was submitted that the total advances given were adequate to meet the increase in the cost of living which had occurred since the outbreak of war, and that the commercial position was such that a further advance in wages would be accompanied by grave risks of injury to the trade.

The Court state that the advance of 6s. a week on time rates and 15 p.ct. on piece prices, which were granted by the last decision, were given on grounds other than the increase in the cost of living; and they reiterate an opinion then expressed that an alteration in the cost of living, though of great importance, does not in itself, and apart from other considerations, necessarily warrant any corresponding alteration in wages. In the course of the hearing the Court were furnished with information respecting the increases in wages which had taken place in other trades; and the argument was developed with ability on behalf of the workpeople that an advance was due in order that the relative level of wages in the engineering trade should be maintained. Though it is proper to have regard to the wages movements or earnings in other trades, the Court doubt whether the restrictive terms of the agreement of February, 1917, permit comparison with them as a governing factor. In any case it would appear that at the present time, when industrial conditions are still disturbed, and when the effects of the war apply with unequal force in different industries, such a comparison would not afford a satisfactory ground for their decision.

In their last decision the Court expressed the view that in ordinary circumstances the most important consideration which arises in deciding whether an alteration of the rate of wages shall take place is the value of the work done in its relation to the state of trade. At the time when the award was given, the position in the industries concerned was such, in view of the Court, as to justify an increase in rates—and an increase was accordingly granted. The published returns show that the state of employment in the trades is still good; but from the evidence submitted on behalf of the employers, it would appear that there are already indications in some branches of a falling-off in demand. The point to which the Court have particularly directed their attention is whether, since their last decision was given, there has been such an improvement in the state of trade, or alteration of general conditions, as to warrant a further increase in rates of wages. It does not appear to the Court that the position to-day differs to such a degree from what it was that the settlement effected by their last decision should be disturbed.

After careful consideration, the Court accordingly find that the claims submitted have not been established. Applications for special advances have still to be considered by the Court.

ROAD TARRING AND THE DESTRUCTION OF TROUT AT CHESHAM.

In the autumn of 1919, the trout in the River Chess were observed to be dying in large numbers in the stretch from Chesham Town, where one of the head-springs of the stream is situated, down to Latimer, a distance of nearly four miles. For the first time in the history of the town, the main street in Chesham was tarred during the summer of 1919; and the inference was that this tarring was directly connected with the trouble. The matter was referred to the Committee appointed early in 1919 jointly by the Ministries of Transport and of Agriculture and Fisheries for the purpose of investigating the alleged damage to fisheries attributed to the tarring of roads. Personal visits were made by the Committee's biologist, who collected all the available information and evidence on the spot. A number of samples of the water and mud were taken from the stream at several points; and specimens of the various effluents discharging into the river were examined by officials of the Government Laboratory.

A full report has now been submitted by the Committee to the Ministries concerned; and in view of the local interest aroused and the importance of the case in its general bearing on the question of river pollution, it is thought that it may serve a useful purpose to make public the conclusions reached by the Committee after consideration of all the facts as presented to them. It has been alleged that roads treated with tar which normally contains tar acids, tar bases, and naphthalene may involve danger to fish life at any or all of the following stages: (*a*) Before the tar has properly set; (*b*) while the road surface remains waterproof; and (*c*) during the breaking-up of the road surface under stresses produced by traffic and weathering. The Chesham roads were tar-painted with refined tar for the first time in their history between May and July, 1919; 1 gallon of tar being used for each 5 square yards of surface. The road surface thus dressed was of a readily friable texture. No harm appears to have been done during the first period of possible danger. In the case of any road rendered waterproof by means of tar or other material, the first shower of rain after a spell of dry weather may wash accumulations—such as manures, petrol, lubricating oils, &c.—off the road into the stream. The Committee could obtain no evidence of the existence of this form of pollution at Chesham. The tarred roads had been repeatedly and energetically brushed after rain, and the brushed-off material removed to a distant spot. The Committee are of opinion that little tar could have been left on the roads for a considerable period before fish were affected, and that such tar as remained was not directly responsible for the mortality which started in November, 1919. They think that the fish mortality was due to a temporary accidental increase in the industrial pollution rather than to increased pollution as a direct result of the alteration in the character of the road drainage due to the tar painting.

Two Points Affecting New Insurance Rates.

From inquiries that have been addressed to the Ministry of Health regarding the recent changes in health insurance, it appears that some misapprehension exists on the part of employers as to the age at which a boy or girl becomes liable to compulsory insurance. The National Insurance Act, 1911, provided that contributions should be payable for employed persons between the ages of 16 and 70. No change has been made by the Act of 1920 in these age limits; and employers are still required to pay contributions as soon as their employees reach the age of 16. In the case of workers between the ages of 16 and 18, the employer may deduct from wages the normal amount of the employee's contribution—*i.e.*, 5d. for a male, and 4d. for a female worker, the employer paying the remaining 5d. Where, however, a worker aged 18 or upwards is not in receipt of board and lodging from the employer, and the rate of remuneration does not exceed 4s. for a full working day, the portion of the contribution that may be deducted is less than the normal. It is a penny less if the rate of remuneration is over 3s. for a full working day; but where the rate of remuneration is not over 3s. for a full day, no deduction may be made from wages. The remuneration limit of £250 a year for compulsory insurance in the case of non-manual workers was fixed not by the recent Act, but by the National Health Insurance Act of last year. The liability of employers to pay contributions for persons affected by that Act—*i.e.*, non-manual workers, whose remuneration was over £160, and not over £250 a year—operated from Aug. 15, 1919, the date of the passing of the Act, and cards were required to be stamped from that date.

It will interest some of our athletic readers to learn that in the Marathon race (promoted for the election of competitors in the Olympic Games in August at Antwerp), Mr. G. F. Piper, Maintenance Fitter of the Harwood Terrace branch of the Gas Light and Coke Company, came in third. The course was Windsor to Stamford Bridge (26 miles 385 yards); and Mr. Piper covered the ground in 2 h. 53 min. 9 sec.

LANCASHIRE STRIKES ENDED.

[From Our Own Correspondent.]

The gas workers strike in Manchester, Salford, and other Lancashire towns came to an end virtually on Wednesday night, a week after its beginning. It started with dramatic suddenness, was carried through with surprising vigour, and ended in a fashion which must have convinced every clear-headed, right-thinking man of the folly of attempting to redress grievances by flying in the face of one's duly accredited leaders. The men ceased work because they did not like the terms agreed upon by their delegates at a conference with the employers' representatives in London on Tuesday, 6th inst. There was not a word of dissatisfaction with these terms while the conference was sitting. It has been said it was wrong to apply the conference findings nationally; but this was done at the wish of the trade union delegates. Obviously, if a mistake had been made through ignorance or a misunderstanding, the the correct thing was to reopen negotiations. But no, the men would not wait for this. They took, as it were, the bit in their teeth; and in Manchester, to the number of 1200, ceased work. Salford followed suit; and their example was followed by the gas workers of Stockport, Radcliffe, Oldham, Bury, and other towns. Then, after a week's idleness and vain protestations, the men went back to work, with an assurance—which they could have had without striking—that their claims shall be further examined.

How foolish and how wasteful the whole proceeding! Manchester alone counts its loss of revenue as not less than £20,000. Then think of the trouble and annoyance to multitudes of people, poor as well as rich, by the stoppage of the gas supply, and the hindrance occasioned in hundreds of hotels and restaurants by inability to use gas-stoves. The public put up with the inconvenience very patiently. There were no frantic cries for the strike to end. As with the tram strike a few months ago, the public feeling seemed to be expressed in the words: "Let the strike go on, and let the strikers suffer the pinch of poverty." There was, of course, some irritation at the fact that a body of men should put the public to so much inconvenience without just cause. The Federation of Employers thought they had acted generously by their decisions, which, as just stated, were made national in their application at the request of the men's leaders.

The strike seems to have started at Radcliffe. Then it was taken up by Manchester, and spread far and near. A few sets of men acted wisely, resolving to follow their leaders. Stretford men, for example, told Mr. Kendrick (the Engineer and Manager of the Stretford Gas Company) that they would not strike unless called out by the officials of their union.

Ignoring their appointed leaders, the strikers set up a Strike Committee for the district. This body flouted the official leaders, and even refused to have them at some of the strike meetings. It required all the tact of Mr. J. R. Clynes, M.P., to get the men to listen to reason at all; and even he had to promise his help to the men in the future if they did not get all they wanted out of the further negotiations. He assured the men that their claims should be put immediately before the North-Western Regional Council, of which Mr. J. Williams, one of their own trade union leaders, is this year the Chairman, Alderman Phillips (of Salford) Deputy-Chairman, and Mr. J. H. Sillitoe Secretary. He gave the men this assurance in writing:

> If, after work being resumed, the Regional Council does not reach decisions which the men are prepared to accept, Mr. Clynes undertakes to support the men in their desire to cease work to enforce claims which the men can accept.

This declaration, Mr. Clynes afterwards said, was an assurance which, in the circumstances, he thought it necessary to give; and he gave it in the belief that the Regional Council would deal reasonably with the points in dispute. He felt, at the same time, that his union would be willing to support the men in constitutional and authorized action, if they thought fit to take it later on.

Mr. Clynes arrived in Manchester on Monday; but a day passed before his aid was sought. He intimated his willingness to address the strikers; but there was no response until Wednesday, when he was invited by the members of the Central Strike Committee to attend their meeting with the labour members of the City Council, at the Manchester Town Hall. At this meeting, he was asked to address the men's assembly called for that evening (Wednesday). It should be stated that, at a meeting of the City Council, held on Wednesday morning, under the presidency of the Lord Mayor, Alderman Fox (who was himself a labour leader before becoming Chief Magistrate), Alderman Kay, the Chairman of the Gas Committee, cleared the air by making known the determination of the authorities that there could be no dealings with labour, organized or unorganized, in this matter until the men went back to work.

The strikers met at 5 o'clock in the open air near the Bradford Road gas-works. Mr. Clynes addressed them, and read the assurance he had to give. A suggestion that the strikers should demand a satisfactory settlement within fourteen days was withdrawn, after Mr. Clynes had characterized it as like holding a pistol at the employers' heads; and a resolution to resume work on Friday morning, instead of Thursday, to allow the Stockport men time to register their decision separately, was carried by a decisive majority. The Manchester decision was accepted by the strikers of all neighbouring towns. The men resumed work on Friday morning; but it was not until Monday that a full normal supply of gas was available by the public. Official warnings were given, in Manchester by Mr. Godfrey W. Kaye (Secretary to the Gas Committee) and in Salford by Mr. L. C. Evans (Town Clerk) against the use of gas while work was stopped. In Salford officials of the Gas Department visited houses and took away the keys of the meters. Where this was not done, some persons did not "play the game," but used the gas when they needed it.

After the resumption of work, no time was lost in convening a gathering of the Regional Council. Mr. Sillitoe called a meeting

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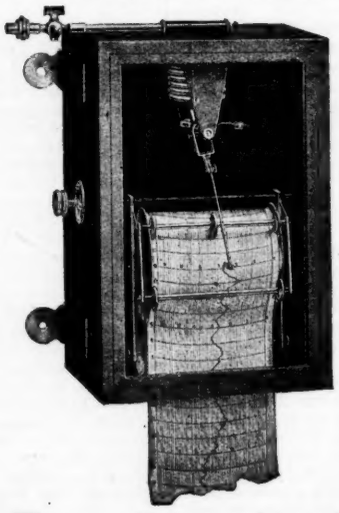
NO LIQUIDS USED.

The chart roll is renewed 6 times a year.



The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

MAKERS:

ALEXANDER WRIGHT & Co., Ltd., WESTMINSTER

for 11 o'clock on Monday morning, at Manchester Town Hall. Mr. Clynes had held out to the men the hope that it would be possible to consider the question of holidays, overtime, and week-end work at this meeting, and that this would be in accord with the national agreement because the national agreement provided arrangements for these matters as a minimum and not a maximum concession. The Employers' Federation, it was understood, were firm in the view that the national agreement, so far as wages were concerned, could not be varied by a Regional Council.

On Monday the gas supply was as usual. Presumably, a way of meeting the men's fair demands will be found by the Regional Council (whose deliberations, of course, are private). By the outside world, the strike is regarded as a lamentable example of hot-headed action, and as pointing to the need for "a more excellent way" of regulating wages. The whole affair, indeed, emphasizes the need for an overhauling of our wage methods. As things are, we are in a vicious circle. As prices advance, so do wages; and as the latter advance, so does the cost of living. In Manchester, it is said, one of the things that tended to unsettle the men was the sight of bricklayers' labourers, engaged on what, to a gas man, seemed a "soft job," receiving £6 or £7 a week as against their £5. The question, surely, which should engage their attention in the near future is as to the possibility of finding means to prevent unauthorized and illegal strikes. There can be no security for peace if large bodies of workmen are to be at liberty to repudiate the decisions of their leaders.

"It has been a very costly victory, if it may be called a victory," said a Manchester financial expert. "The strikers themselves, taking Manchester alone, must have lost over £4000 in wages through the week's strike. The Gas Department have a yearly income on present prices of nearly £1,500,000; and their revenue will thus be lower through the enforced idleness by about £27,000. There are other direct losses which cannot be so easily determined. Wage-earners in the city thrown idle by the strike have suffered to the extent probably of £50,000; and the industries to which they belong cannot have lost less than £25,000 in reduced production and profits, and in the provision of substitute lighting and power. Then there has been a big expenditure in out-of-work pay to the workers thrown temporarily idle; and I think a fair figure to cover this would be £15,000. Taking all these approximate figures together, you arrive at a total of £120,000, which is a very low estimate of what the strike has cost Manchester."

BRISTOL MEN GO BACK.

At Bristol last Thursday afternoon, a discussion took place between Directors and officials of the Gas Company and representatives of the men. The proceedings were of a friendly character; and the management of the Company made it quite clear that, though they must abide by the national award, should this award be modified by future negotiations, they will, with equal loyalty, accept the new conditions. This discussion was brought about through the good offices of the Lord Mayor. Mr. Oates (the District Organizer of the National Union of General Workers), and representatives of all departments of the Gas Company's works, approached his Lordship and requested him to arrange a meeting with the Board of the Company. The Lord Mayor's request to the Company for a conference with the workers was at once granted; and the strikers' delegates proceeded to the offices of the Company, where they were met by Mr. J. H. Howell (the Chairman), Sir George Davies, the Secretary (Mr. S. E. Halliwell), and the Engineer (Mr. R. Robertson). There was a long discussion; and the representations of the strikers having been fully considered, Mr. Howell announced the attitude of the Board in the following terms:

> The Directors of the Bristol Gas Company abide by the national settlement agreed to by the representatives of the employers and employed, after protracted negotiations, on the 6th inst., from which they cannot deviate. If, after the men resume work, and not before, the men's representatives re-open negotiations with the representatives of the employers and the national terms are modified, the Bristol Gas Company will loyally abide by them.

This position was laid before the strikers at a mass meeting next morning, when the following message was read from Mr. Hurley, the Secretary for the Western District area of the Union:

> If the men return to work, negotiations will be opened at once with the National or Regional Gas Councils; and if the settlement is not satisfactory to the men, the Union pledges itself to support them.

The message from Birmingham was put to the meeting as a resolution; and it was decided unanimously to return to work at once, and that the branch officials should see the Company to determine the best way to resume work as quickly as it could be arranged, having regard to the dislocation. It was not possible to resume a full supply of gas on Sunday; and consumers were cautioned against turning on taps before being officially notified that a supply was available. The notice to both domestic and industrial consumers that a normal gas supply was again available was published, as anticipated, on Monday. Every effort was made by the Company to expedite the resumption of a supply of gas; and immediately this was available late on Saturday evening, all the medical institutions and nursing homes were informed by telephone. Over a hundred inspectors were detailed off to test the conditions of supply at various points all over the district and suburbs during the whole of Sunday. Gas was, as a matter of fact, available in time for most people to cook their Sunday dinner by it.

WORK RESUMED IN OTHER TOWNS.

In accordance with the promise given by the Mayor of Wigan (Mr. James Walkden) to local gas workers, who returned to work pending negotiations, the Wigan Gas Committee, at a mass meeting of the men, reported on the efforts which had been made to have the recent award reconsidered. Mr. H. Farr (the Chairman of the Gas Committee) said the Town Clerk had written a letter to the Chairman of the

The "New Main" Cookers.

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Constructed of highest grade cast iron and porcelain enamelled steel, with first-class brass work.

The "New Main" is a series with many outstanding improvements.

One special feature is the treble crown in the oven roof; this is packed with slag wool, reducing heat loss to an absolute minimum.

Investigate the "New Main." Let us send you a sample.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18: Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, Glasgow; 18, Severn Street, Deansgate, Manchester; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Northern Section of the Gas Employers' Federation, pointing out that the members of the Wigan Gas Committee were unanimously of opinion that the full amount of 10s. should be awarded, it being the view of the members, composed of employers of labour and labour representatives, that it was futile to expect gas stokers to be working for 1s. 9½d. an hour while builders' labourers, for instance, were receiving 2s. 1½d., and workers in practically every other trade were having more. Following this a meeting of the Executive of the National Federation was convened, when Mr. Farr placed the official view of the Wigan Gas Committee before the Executive, with the result that it was decided that powers should be given to industrial areas in the North to deal with questions at issue according to the special circumstances of the district.

The strike among the Huddersfield gas workers came to an end last Thursday, after a five days' duration. The settlement was arrived at by the Gas Committee making an offer to recommend to the proper authority the granting of the extra 4s. per week, and that no victimization should take place. This offer was later in the same afternoon considered by the men, who decided to accept it. Some of the men returned to their work the same night—within an hour and a half of the settlement being arrived at. As the gasholders were practically exhausted, a full restoration of the service in the principal parts of the Huddersfield area was not possible until Wednesday or Thursday of this week. In the Longwood district, however, the supply was restored on Friday evening last, owing to the fact that the smallness of these works enabled the fires to be kept alight. Two thousand people have been compelled to remain idle in consequence of the strike; and it is estimated that the loss of revenue to the Gas Department is between £8000 and £9000.

The gas workers of Accrington, who threatened to leave work last Saturday unless their demands were conceded, have decided to continue their employment for another fortnight. During this period further negotiations are to take place. The men demand time-and-a-half for all overtime except Sunday, on which day they ask for double time. They also desire a fortnight's holiday with pay, instead of a week granted in the original settlement.

The Nelson branch of the Gas-Workers' Union have passed a resolution protesting "against our officials not carrying out the members' strike ballot and ignoring the telegram previously sent by Nelson gas-workers protesting against accepting anything less than the original demand of 10s. per week;" also protesting against "the General Secretary feeding the capitalist Press with information, which we consider detrimental to the best interests of our members."

The gas workers employed at Halifax, Brighouse, Elland, Sowerby Bridge, and Hebden Bridge held meetings to consider the settlement; and, while strongly criticizing the terms, they decided under protest to accept the advice of the officials and abide by their decisions. Efforts are, however, being made to secure further concessions with regard to overtime and holidays.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 14.]

Nos. 18,529—20,352.

AKT.-GES. FÜR BRENNSTOFFVERGASING.—"Treatment of coking coals for extraction of nitrogen." No. 20,164.

AKT.-GES. FÜR BRENNSTOFFVERGASING.—"Discharge device for gas-producers." No. 20,165.

BATES, J.—"Apparatus for the production of pressure gas." No. 18,708.

BECK, E. F. A. D.—"Valve-cocks." No. 19,046.

BERZTIT GES.—"Distillation of low-grade fuels." No. 20,317.

BLOKHUIS, J. K. F.—"Inverted incandescent gas-burners." No. 20,325.

BRAACH, P.—"Gas-cooker." No. 18,942.

BRONN, J. I.—"Treatment of coke-oven gases." Nos. 18,709, 19,015.

BROOKE, T.—"Furnace for combustion of coke, &c." No. 18,779.

BUTTON, E. A.—"Blowers and exhausters." No. 19,771.

CANNON, F. P.—"Carbonizing." No. 19,262.

CHEMISCHE FABRIK RHENANIA AKT.-GES.—"Manufacture of nitrogen-containing additions and condensation products from acetylene and ammonia." No. 19,039.

COLLIN AKT.-GES. ZUR VERWERTUNG VON BRENNSTOFFEN UND METALLEN, F. J.—"Recovering the bye-products from fuel gases." No. 19,592.

COPPÉE AND CO., E.—"Regenerating furnaces." No. 19,741.

CUMMINS, F.—"Vertical gas-retort settings." No. 18,825.

DEMPSTER, R. & J.—"Means for discharging gas-retorts, &c." No. 18,820.

EVANS, E. V.—"Removing sulphur from gases." No. 20,332.

FORTI, V.—"Automatic systems of lighting and extinction of gas-burners, &c." Nos. 19,007, 20,129.

GARRETTS, A. & J.—"Reducing-valves." No. 18,887.

GROB, W.—See Chemische Fabrik. No. 19,039.

HOLLINGS, H.—"Removing sulphur from gases." Nos. 20,332, 20,333.

HUNT, S. B.—"Production of alcohols, esters, &c., from gaseous hydrocarbons." Nos. 18,856.

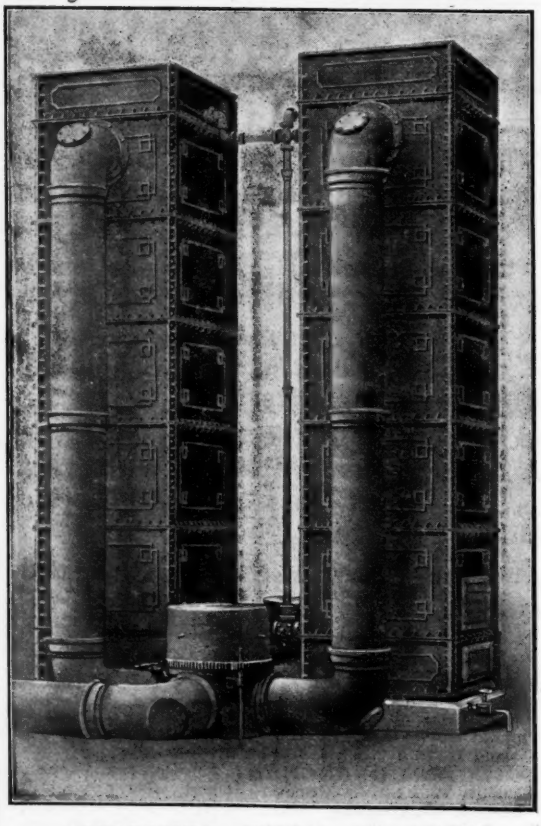
IBACH, P.—"Pressure-regulators." No. 20,013.

JUNKERS, H.—"Means for preventing condensation of moisture from combustion or heating gases." No. 19,735.

KNIGHT, H. S.—See Dempster. No. 18,820.

KRAMER, R.—"Pipe-joints." No. 19,932.

LINCK, K.—"Gas-producers." No. 20,166.



"BEARSCOT" TUBING IN WATER CONDENSERS EXTENDS UPWARDS OF 130 MILES.

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AS FITTED WITH THE **"BEARSCOT"** SAFE JOINT TUBE.

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MANCHESTER.

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MAZZA, E.—"Means for separating elements of gaseous mixtures." No. 19,256.
MELAMID, M.—"Process for converting tar oils into neutral oils for lubricating." No. 18,833.
MEYER, P.—"Carbonizing solid fuels." No. 19,151.
O'BRIEN, E. J.—"Cabinet cover for gas-cookers." No. 19 402.
PETZEL, G.—"Separation of gas mixtures." No. 20,214.
PHILIPSON, O. F.—"Coal-tar disinfectants." No. 19,913.
PINTSCH AKT.-GES., J.—"Gas-producer." Nos. 18,863, 19,478.
PINTSCH AKT.-GES., J.—"Gas-meters." No. 19,677.
PINTSCH AKT.-GES., J.—"Apparatus for measuring quantity of flowing gases." No. 19,944.
PINTSCH AKT.-GES., J.—"Gas-meters." No. 20,121.
PINTSCH AKT.-GES., J.—"Means for consecutively discharging gas-holders into supply main." No. 20,122.
RIEDEL, F.—"Process for combustion of gas." No. 18,973.
ROMBACHER HÜTTENWERKE.—"Treatment of coke-oven gases." Nos. 18,709, 19,015.
ROSS-SCHOFIELD ENGINEERING COMPANY.—"Reducing-valves." No. 18,887.
SCHMITZ, H.—"Gas-engines." No. 20,005.
SCHOFIELD, H.—See Ross-Schofield. No. 18,887.
SCHROETER, G.—"Hydrogenation of naphthalene." No. 19,394.
SCHWERZ, J.—"Means for maintaining a definite pressure in connection with liquids, vapours, or gases." No. 19,036.
SIDDALL, F. J.—See Dempster. No. 18,820.
SIEMENS AND HALSKE AKT.-GES.—"Photometrical apparatus. No. 19,191.
SIMMANCE, J. F.—"Calorimetric apparatus." No. 18,762.
SLOMAN, J.—"Inverted gas-mantles." No. 19,523.
SMOOT, C. H.—"Pressure or volume recording meters." No. 19,258.
SOUTH METROPOLITAN GAS COMPANY.—See Hollings. Nos. 20,332, 20,333.
STANIER, H.—"Removing sulphur from gases." No. 20,332.
STILL, C. [Firm of].—"Travelling coke-loading device." Nos. 19,124, 19,125.
STILL, C. [Firm of].—"Method of treating crude gas liquor to obtain ammonia solution." No. 19,126.
STILL, C. [Firm of].—"Purifying coal gas." No. 19,518.
STILL, C. [Firm of].—"Recovery of ammonia from products of distillation of coal, &c." No. 19,739.
STILL, C. [Firm of].—"Separating constituents from coke-oven, &c., gases." No. 19,740.
STUER, B. C.—See Chemische-Fabrik. No. 19,039.
TETRALIN GES.—"Hydrogenation of naphthalene." Nos. 19,514, 19,750.
TICKNER, H. L.—"Pressure-regulating valves for gas." No. 18,907.
WAYMARK, L. L.—See Tickner. No. 18,907.
WOOLF, E. J. & J. F.—"Gas-engines." No. 18,580.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 19.

Inquiries for pitch for next season's export are numerous, and makers are not disposed to accept under 170s. net per ton *ex* works. There is also a good home demand. Benzol, toluol, and solvent naphtha are in request, and their price is reported to be about 3s. 9d. net per gallon in bulk. Other products remain unchanged.

Sulphate of ammonia for the home farmers is £23 10s. per ton for 24½ p.ct. for this month's delivery; the price being increased by 10s. per ton for Augu

Tar Products in the Provinces.

July 19.

The average values for gas-works products during the week were: Gas-works coal tar, 108s. 6d. to 113s. 6d. Pitch, East Coast, 172s. 6d. to 177s. 6d. per ton f.a.s.; West Coast—Manchester, 172s. 6d. to 177s. 6d.; Liverpool, 172s. 6d. to 177s. 6d.; Clyde, 172s. 6d. to 177s. 6d. nominal. Benzol 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 1s. 8d. to 1s. 9d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 1s. to 1s. 0¼d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 0¼d. Carbolic acid, 60 p.ct., 4s. to 4s. 1d. Naphthalene, £40; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is a good tone generally about markets for tar products; and there is no weakening in prices, but rather the reverse. The gas-workers' strike has ended; but the effect has yet to be felt, particularly in the Provincial centres. Pitch remains very strong, and consumers are most anxious to cover themselves over next season. All sorts of prices are coming to hand, and even Manchester sellers are now asking £9 per ton. What price may be reached in the winter no one can say, as it will largely depend on the action of the miners. If they strike, fuel prices may go to any height, and pitch would share in the advance. So also would creosote, which still remains in continued demand, although at the moment quotations are unchanged. Solvent naphtha is about as a week ago; but the demand seems likely to fall off shortly, as the rubber trade is reported slack and working only part time. Heavy naphtha is steady. The demand for naphthalene

No Cooker Complete without a Plate Rack

Supplied complete with white enamelled splasher, the whole forms an indispensable adjunct to every modern gas-cooker.

———and no Plate Rack so complete as Richmond's.

Since our introduction of this attachment it has become of universal manufacture, but the initiative still rests with us. Ours is the only pattern (protected by patent) that holds plates in a vertical position so all are equally and thoroughly heated—not merely the bottom one or two as in plates stood in a pile.

A Plate Rack does not burn gas, but, by the convenience it provides, it induces a more regular use of the Cooker.

THE RICHMOND GAS STOVE & METER CO., Ltd.,
WARRINGTON and LONDON.

is great, and stocks are scarce. Sellers are askings various prices; but the general tendency is towards a higher range of values. Other products are without feature.

The range of quotations is as follows:

Benzol: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 87s. 6d. to 90s.; Midlands, 85s. to 87s. 6d.; North, 85s. to 90s. per ton *ex* works. Refined tar, 65s. per barrel (free) on rail.

Pitch: London, 190s. per ton; East Coast, 185s. to 190s. per ton; West Coast, 185s. to 190s., with Manchester 190s. per ton, and Glasgow 190s. per ton; South Wales, 195s. per ton.

Solvent Naphtha: London, 3s. 6d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 8d. per gallon.

Naphthalene: Refined, £50 per ton nominal; inferior, £35; crude, £14 to £22, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 4s.

Creosote: London, 1s. 1½d. to 1s. 2½d.; North, 1s. 1½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 9d. to 1s. 10d. per lb., drums extra.

Aniline Salts: 2s. to 2s. 3d. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. 8d. per gallon; crystals 40%, 1s. 3d. to 1s. 4d. per lb. (nominal).

Salicylic Acid: Technical, 3s. 3d. to 3s. 6d.; B.P., 3s. 9d. per lb.

Xylol: Pure, 6s.; commercial, 4s. 9d. per gallon.

STOCK MARKET REPORT.

THE firm tone which characterized most markets on the Stock Exchange at their close a week ago was fairly well reflected in the earlier days last week. In many lines there were moderate advances in prices; the somewhat sanguine anticipations indulged in with regard to financial (and especially fiscal) problems being unabated. But a change of wind was apparent on Thursday, and things were less bright. Realizations where profits could be secured were the order of the day; and this movement lasted more or less up to the close.

The result in the gilt-edged market was that Home Government issues finally lost most of what they had gained (except Victories). Friday's figures were: Consols 46¾-47¼, War Loan 85 5/16-86 1/16, Funding 69½-70, Victory 77½-78. Bonds had a fall, and new Corporation issues went down. Home Rails were quite and rather irregular; but the prior charges were in request.

The Foreign Market showed strength: French, Belgian, Brazilian, and Russian scoring advances; but Spanish and Chinese were not in favour.

In the Miscellaneous Market were several good lines. Rubbers and oils fluctuated, but were mostly considerably better on balance. Iron and Steel, Textiles, and Nitrates were very firm.

Business in the Gas Market showed a little more animation, and a few of the less conspicuous issues contributed transactions to swell the aggregate. The tone, too, was decidedly firm. In the London companies, all four Gas Light and Coke issues advanced from 1 to 3 points each, South Metropolitan touched 61, and Commercials were steady. In Suburbans Tottenham and Edmonton "B" rose 2. Imperial Continental was very quiet, marking time, and the quotation was unchanged. In Primitivas, the ordinary changed hands at 13s. and the preference at 30s. The state of affairs in Turkey depressed Ottoman shares a point.

The bargains done for cash during the week were: On Monday, Bombay 5, British 23¾, Continental Union 28, 28¼, European 5¼, 5 5/8, Gas Light ordinary 57⅞, ditto preference 56, 58, Imperial Continental 125, 126, 126½, 128, South Metropolitan 59, 60. On Tuesday, Bournemouth "B" 9 5/8, Gas Light ordinary 57, 57¼, 57½, 58, 58½, 59, ditto maximum 41½, ditto debenture 47, 47½, Imperial Continental 127⅝, Primitiva debenture 70, South Metropolitan 59⅝, 61. On Wednesday, Gas Light ordinary 58½, ditto debenture 46¾, Imperial Continental 126, Oriental 104½, Primitiva preference 32s. 6d., 35s., South Metropolitan 59¼. On Thursday, British 23, 23⅜, Croydon "C" 94, European 5 1/16, Gas Light ordinary 58½, 59, 59¼, 59½, 60, ditto preference 57, Imperial Continental 125, 127, ditto debenture 84, Primitiva 13s., ditto preference 30s., 31s. 3d., South Metropolitan 59⅝, 60. On Friday, Alliance and Dublin debenture 55, Brentford "A" 50, European 5⅛, Gas Light ordinary 59½, 59⅝, 60, ditto preference 59, ditto debenture 47, 48¼. Ilford debenture 56¾, 56⅞, Imperial Continental 125, Lea Bridge 85, Primitiva 13s. 11¼d., 15s., ditto preference 32s. 6d., South Metropolitan 59½, 59⅝, 60¼, ditto debenture 46, Wandsworth "B" 62, 63.

In the Money Market, conditions generally ruled easy for the first half of the week; but on Thursday a stronger demand arose, which tightened rates up, though they eased somewhat at the close. Discount rates did not harden. Silver was fairly steady. The Bank rate is 7 p.ct., as fixed on April 15.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref. .	...	58—63	...
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	42—47	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	55—60*	55
280,000	5	May 13	7½	8%	Bombay, Ltd. . . .	5¼—6¼	4¼—5¼	5
50,000	10	Feb. 26	16	10%	Bournemouth Gas and Water { 10 p.c. . .	29—30	8¼—9	...
383,110	10	,,	7	7%	B 7 p.c. .	15—15½	9—10	9⅛
115,000	10	,,	6	6/–	Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 25	—	4%	4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/–	Brentford A Consolid. .	261—266	45—50*	50
734,920	,,	,,	11	26/3	Do. B New . .	204—209	43—48*	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	68—73*	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb. .	91—93	63—65	...
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig. .	208—213	121—126	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	80—85	...
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max. . .	...	...	...
530,000	20	April 14	12½	10%	British	44—45	22—24	23—23½
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	45—48	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref. .	4—6	5½—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	...	...
1,513,280	,,	Feb. 26	5/9/4	33/4	Commercial 4 p.c. Stk.	106—108	51—56	...
560,000	,,	,,	5½	26/8	Do. 3½ p.c. do.	103—105	44—49	...
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	—
809,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	28—28¼
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	...
51,600	,,	Feb. 26	14½	10½%	Croydon A 10 p.c. . .	...	130—140	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	...	90—100	94
492,270	Stk.	—	6	5%	Derby Con. Stk. . .	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd. . . .	17½—18	5½—6½	5½—5 15/16
16,298,975	Stk.	Feb. 12	4/17/4	30/–	Gas { 4 p.c. Ord. . .	98—102	56—61	57—60
2,600,000	,,	,,	3½	26/8	Light { 3½ p.c. max. .	76—79	40—45	41½
4,062,235	,,	,,	4	4%	and { 4 p.c. Con. Pref.	96—99	57—60	56—59
4,674,850	,,	June 25	3	3%	Coke { 3 p.c. Con. Deb.	72½—74½	46—49	46½—48½
130,000	,,	Dec. 11	10	10%	10 p.c. Bonds. .	...	...	...
82,500	,,	Mar. 11	5	3½%	Hastings & St. L. 5 p.c.	...	55—60	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	38—43	...
70,000	10	May 13	11	7%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Mar. 11	9	6½%	Hornsey 7 p.c. . . .	...	88—93	...
131,000	,,	,,	7⅞	5½%	Ilford A and C . . .	151—154	86—91	...
65,780	,,	,,	6¼	4½%	Do. B	115—118	65—70	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb. . .	92—94	55—58	56½—56¾
4,940,000	,,	May 14	9	4½%	Imperial Continental .	150—160	125—130	125—128
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	80—85	84
235,242	,,	Mar. 26	6¼	5½%	Lea Bridge Ord. 5 p.c. .	119—121	80—85	85
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A.	211—213	...	...
					{ B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Feb. 26	7/5/6	3½%	Maidstone 5 p.c. . .	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4¾	1¾—2¼	...
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	89—96	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd. . .	11½—12	70—75	...
1,875,892	,,	Feb. 26	4½	3½%	Newcastle & Gatsh'dCon.	98½—99½	61½—62	...
529,705	,,	June 25	3½	3½%	Do. 3½ p.c. Deb.	82—83	50½—52½	...
15,000	10	Mar. 11	—	8½%	North Middlesex 10 p.c.	...	13—13½	...
55,940	10	,,	7/14/0	6½%	,, ,, 7 p.c.	14—15	7¾—8¼	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd. . . .	117—122	102—105	104½
60,000	5	Mar. 26	10	1/–	Ottoman, Ltd. . . .	7½—7¾	2—3	...
60,000	50	Mar. 11	13	7½%	Portsea Island, B . .	128—131	66—71	...
100,000	50	,,	12	6½%	Do. C . .	118—121	53—58	...
249,980	5	April 29	8	—	Primitiva Ord. . . .	5½—6	½—1	13/—15/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref. .	4½—5	1½—2	30/—35/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb. .	91—93	69—71	70
600,000	Stk.	Jan. 29	4	4%	Do. ,, ,, 1911	...	47—50	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	45—48	...
150,000	10	Mar. 26	6	6/–	San Paulo { 6 p.c. Pref.	10½—11	6¼—7½	...
125,000	50	July 2	5	5%	5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Mar. 11	10	50/–	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4½%	Do. B	222—224	58—63	...
523,500	,,	,,	10	35/5	Do. C	220—222	54—57	...
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c. . .	...	...	...
90,000	10	June 25	9	9%	South African	10½—11½	11—12	...
6,609,895	Stk.	Feb. 12	5/4/0	30/–	South Met. 4 p.c. Ord..	111—113	56—61	59—61
250,000	,,	July 14	—	5%	Do. Pref. . .	...	91—93*	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb..	72½—74½	45—47*	46
224,820	,,	Feb. 26	8½	3%	South Shields Con. Stk.	157—159	99—101	...
1,087,795	,,	Aug. 14	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	...
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	71—76	...
647,740	,,	May 13	7½	3½%	Southampton Ord. . .	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 14	—	3½%	Tottenham { A 5 p.c. .	135—138	60—65	...
782,275	,,	,,	6	2½%	District { B 3½ p.c. .	115—117	52—57	—
181,255	,,	June 10	4	4%	{ 4 p.c. Deb.	87—89	60—63	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd. . . .	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mar. 11	5	3½%	Tynemouth 5 p.c. max.	108½—109	71—73	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8½	55/–	Wandsworth A 5 p.c.	151—156	83—88	...
255,636	,,	,,	6½	40/–	Do. B 3½ p.c.	129—134	61—66	62—63
108,075	,,	,,	—	38/6	Do. C . . .	...	61—66	...
140,865	,,	,,	—	38/6	New Ordinary	...	61—66	...
352,000	,,	,,	6½	33/9	Wimbledon 5 p.c. . .	117—122	60—65	...
98,000	,,	,,	6½	40/–	Epsom 5 p.c. . . .	121—126	60—65	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk. . .	66—69	44—47	...

*Ex Div.

Sulphate of Ammonia.

Supplies are good. The export trade is active and of much larger volume than twelve months ago. Prices for export range up to £50. For home uses, trade is along equable lines at the fixed prices. It is gradually being realized that, despite the higher prices, the farmer is obtaining this important fertilizer for less than economic value. From America, the news is that a rather peculiar position has developed. The regular handlers of the material are firm in their attitude, and not inclined to make concessions. Occasional lots appear in the market for resale. These parcels were originally sold for shipment to Japan; but they are now being sold at slightly below the market, and thus constitute a disturbing element. No further shipments are being made to Japan, that country being already overbought. A good demand is noted in America for material from other countries, and it is declared there that sulphate of ammonia from Great Britain is no longer on a competitive basis with the domestic market.

Mr. J. F. Davy has recently taken up the position of General Works Manager at the Stechford works of the Parkinson Stove Company, after having held a similar position for upwards of twelve years with Messrs. John Wright & Co., of Aston, Birmingham.

Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., are offering for sale by tender, on behalf of the Tendring Hundred Water-Works Company (who also own a considerable gas district in Essex), £10,000 of 7 p.ct. redeemable debenture stock, at the minimum price of par.

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Resists 4500° Fahr. Best for Gas-Works.
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Head Office:—Temple Courts,
55, Temple Row,
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Full particulars for membership, &c., can be obtained from the General Secretary.

GAS GUILDS.

THOSE interested in the Formation of Local, District, and National Guilds of Officials of the Gas Industry are invited to communicate with the Secretary of the Newcastle and Gateshead Gas Company's Officials' Guild, D. WALTON, 16, Hartburn Place, NEWCASTLE-ON-TYNE.

APPOINTMENT, &c., WANTED.

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THE Applicants for the Post in a 100,000,000 Works in Scotland are hereby Informed that the POSTION HAS BEEN FILLED, and are THANKED for their Applications.

COUNTY BOROUGH OF SMETHWICK.
(GAS DEPARTMENT.)

DEPUTY ENGINEER.

THE Gas Committee invite Applications for the Position of DEPUTY ENGINEER. Candidates must be Well Trained, Energetic, and Thoroughly Experienced in up to date Carbonization Methods (including Vertical Retorts, Steaming, and Water Gas); Electrically driven Machinery, Drawing Office and Machine Shop Practice; also Well Qualified to Exercise Control of Workmen—taking Full Charge when required—and Competent to Carry Out all the usual Tests and Analyses of a Gas-Works.
Applications, endorsed "Deputy Engineer," stating Age, Qualifications, Details of Experience, and Salary required to commence, with *copies* of recent Testimonials, to be addressed to the Chairman of the Gas Committee, as under, not later than Wednesday, the 28th of July.

W. J. STURGES,
Secretary.

Gas Offices,
Council House,
Smethwick,
July 8, 1920.

WANTED for the County Borough of Smethwick Gas Department a Thoroughly Experienced and Reliable RENTAL CLERK, with good knowledge of General Routine of a Gas Office.
Applications, stating Age, full Details of Experience and Qualifications, Salary required, and earliest date at liberty, with *copies* of recent Testimonials, to be sent to the undersigned.

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Gas Offices,
Council House,
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WOLVERHAMPTON GAS COMPANY.

WANTED by the Wolverhampton Gas Company a Capable ASSISTANT in the Distribution Department.
Apply, giving full Details of Experience and Stating Age, to the undersigned.

P. G. WINSTANLEY,
Engineer and Manager.

ATHERTON URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

WANTED, at once, a Capable Works FOREMAN. Must have had a Good Experience in the Working of Regenerative Furnaces and the Manufacture of Sulphate of Ammonia.
Applications to be sent to Mr. W. T. Duxbury, Gas and Water Manager, Atherton.

W. GARNETT,
Clerk.

Town Hall,
Atherton.

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FOR Immediate Sale, subject to being unsold, Nine MOND Single Shell Type GAS PRODUCERS, complete with Superheaters, Gas Collecting Main, &c.
Particulars on Application to the BIRCHENWOOD COLLIERY COMPANY, LTD., Kidsgrove, STOKE-ON-TRENT.

FOR SALE.—Complete Free and Fixed AMMONIA STILLS by Goddard, Massey, and Warner. Capacity, 5 Tons of Liquor per diem.
ORMSKIRK AND DISTRICT GAS AND ELECTRICITY COMPANY, 64, Aughton Street, ORMSKIRK.

FOR SALE.—Three sets of Water Lute PURIFIERS, about 14 ft. 6 in. square, in good condition, with Valves, Connections, Bearers, Grids, and Lifting Gear Complete. Each Set Complete with Connections weighs about 70 Tons. Materials can be Delivered by boat in Thames or Tyne; and Offers are invited including Carriage, Insurance, and Freight. The Boxes are erected in a north of France Coast Town; and further Particulars can be given, or inspection of the Boxes can be arranged, if desired.
Apply by letter only, to F. H. JONES, 13, Queen Anne's Gate, S.W. 1.

GRAYS AND TILBURY GAS COMPANY.

FOR SALE—
One Biggs Wall CHARGING MACHINE and TRAVELLING TRACK.
One Wilton's TAR DEHYDRATING PLANT, 100 gallons capacity per hour.
Also, One SPIRAL-GUIDED GASHOLDER in STEEL TANK, 14,500 c.ft. capacity.
For any further Particulars apply to the ENGINEER, Gas-Works, GRAYS, Essex.

FOR Sale, Cheap, Fourteen New Fire-CLAY Retorts ⌂ Section, 14 in. by 18 in. by 9 ft. Long, with MOUTHPIECE at each end.
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RAILWAY Tank Wagons for DISPOSAL. Excellent Condition, both Cylindrical and Rectangular. Would prospective buyers please state their requirements.
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OVERHAULED Second-Hand High SPEED TOOLS, cheap; 6 9½ in. S. S. S. and &c. Gap LATHES, DRILLING MACHINES, MILLERS, CAPSTANS, GEAR CUTTING MACHINES, &c.
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ONE Closed Type Saturator, complete with Acid Catcher and capable of treating 25 Tons of Sulphate per Week.
Address, No. 6928, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

GASHOLDER Wanted, with or without TANK, 20,000 to 40,000 c.ft. capacity; also WATER-GAS PLANT for 20 Million Works.
State Particulars and Price, in first instance, to No. 6923, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED, immediately, a Gasholder, about 25,000 to 35,000 c.ft. Capacity, Complete with Water Tank and all Fittings.
Information, Price, Time of Delivery, and Where it can be Inspected to SYNTHETIC AMMONIA and NITRATES, LTD., STOCKTON-ON-TEES.

CONTRACTS OPEN.

THE Redruth Gas Company invite TENDERS for the Supply of 1000 Tons of BEST GAS COAL, 65 p.ct. Large, Delivered Redruth Station, over a period of Twelve Months.
Tenders to be Delivered to the undersigned on or before Aug. 1, 1920.
Signed for the Redruth Gas Company,
S. HOWARD LANYON,
Proprietor and Manager.

TEIGNMOUTH URBAN DISTRICT COUNCIL.

THE above Council invite Tenders for 4500 Tons of GAS COAL, to be Delivered over the Twelve Months ending Sept. 30, 1921.
Further Particulars to be obtained from the undersigned.
Tenders to be received on or before Aug. 24, 1920.

H. HIGHAM,
Gas Engineer and Manager.

Teignmouth.

BOROUGH OF PLYMOUTH.
(GAS-WORKS.)

THE Gas Committee of the Plymouth Corporation are prepared to receive TENDERS for the Supply of 25,000 Tons of GAS COAL, to be Delivered in such quantities as may from time to time be determined as from the 1st of September next.
The Coal is to be delivered f.o.r. Keyham Station, Devonport, or f.a.s. Corporation Wharf, Devonport.
Forms of Tenders and Specification may be obtained from the undersigned.
The Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender for Gas Coal," and addressed to the Town Clerk, Municipal Buildings, Plymouth, are to be Delivered on or before Saturday, July 31, 1920.

W. P. TERVET,
Engineer and Manager.

OLDHAM CORPORATION.
(GAS-WORKS.)

THE Gas-Works Committee invite OFFERS for the Supply of the MATERIAL and LABOUR required to lay a 6-in. HIGH-PRESSURE FEEDER MAIN, a length of 2180 yds., complete with COMPRESSORS suitable for dealing with a volume of 200,000 c.ft. per hour. The Main will be a feeder to an 18-in. Low Pressure Main.
Further information which may be required, can be obtained from Mr. Ernest Parry, Commercial Superintendent, Gas-Works, Oldham.

JOSEPH J. WILLIAMS,
Town Clerk.

Town Hall, Oldham,
July 14, 1920.

BARNOLDSWICK URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the SURPLUS TAR and AMMONIACAL LIQUOR produced at their Works, and Delivered during the Twelve Months commencing Sept. 1, 1920.
Contractors are also to state if they are prepared to accept under the Yorkshire Tar Scheme.
Form of Tender and other Particulars may be obtained from the undersigned.

J. W. THOMPSON,
Engineer and Manager.

COMPANY NOTICES.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 11th day of August next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th of June last, and to declare a Dividend for the same period.
The TRANSFER BOOKS WILL BE CLOSED from the 28th day of July inst. until after the Meeting.

By order,
F. MCLEOD,
Secretary.

Offices: 709, Old Kent Road,
London, S.E. 15,
July 17, 1920.

EUROPEAN GAS COMPANY, LIMITED.

NOTICE is Hereby Given that the ANNUAL GENERAL MEETING of the Shareholders will be held on Tuesday, the 27th day of July, at 2 p.m. precisely, at the Offices, Finsbury House, Blomfield Street, London, pursuant to the Regulations of the Company: To receive the Report of the Directors and the Accounts of the Company for the year ended the 31st of March, 1920; to Elect Directors and Auditors in the place of those retiring; and to Transact the Ordinary Business of such meeting.
The Accounts to be submitted to the Shareholders will be open for Inspection at the Company's Offices on and after the 19th of July.
The TRANSFER BOOKS WILL BE CLOSED from the 23rd of July to the 10th of August, both days inclusive.

By order of the Board,
F. ELIOT WILLIAMS,
General Manager and Secretary.

Finsbury House,
Blomfield Street,
July 15, 1920. London, E.C. 2,

In accordance with clause 48 of the Company's Articles of Association, the Bearer of a Share Warrant may, on Depositing his Warrant at the Office not less than 48 hours before the time of holding any meeting of the Company, with a Statement in writing of his name and address, be present at such meeting, and vote thereat in respect of the shares included in such Warrant.

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J. & J. DEMPSTER, LTD., BONNAUGHT MANSIONS, 34, VICTORIA STREET, S.W. 1.
MANCHESTER.
THE NOTTINGHAM PAT. NOTT. COKE BREEZE & COAL WASHER.
SOLE MAKERS OF THE